arbitrary limit excludes South Georgia and the South Sandwich groups, whose floras are intermediate between Tierra del Fuego and the Falkland Islands to the north and the Graham Land Archipelago to the south. It also excludes Macquarie Island, the southernmost of the islands between New Zealand and South Victoria Land, and Kerguelen Land which is nearest to Kaiser Wilhelm II Land.

After the collections of Joseph Dalton Hooker, on the voyage of the Erebus and Terror (1839–1843) from Cockburn Island in the Graham Land Archipelago, little information was available until the beginning of the twentieth century. Since then our knowledge has increased very rapidly, as may be seen in the accompanying table. The number of species given is only approximate, as it is very difficult to evaluate the synonymy from lists of species without descriptions of the Antarctic plants. For some of the expeditions we may have overlooked publication of the results or specimens may not have been secured, but the table does give a rough comparison of results.

TECHNIQUE

With few exceptions most of the specimens were brought back from Antarctica in a dried condition. The larger ones were placed in a moist chamber and thoroughly softened before they were killed in formol-acetic-alcohol. Small saxicolous species were moistened *in situ* with a drop of 95 per cent alcohol followed by a drop of water, then placed in the killing solution. Specimens fixed at the time of collection were preserved in 4 per cent formalin or 70 per cent alcohol. Following fixation all material was dehydrated by a butyl alcohol series according to Zirkle ('30). Usually the material was allowed to remain in the paraffin oven about 72 hours previous to imbedding. After imbedding, the blocks were trimmed and left to soak in water for 48 hours, then sectioned. Lichens, usually thought to be difficult to cut in paraffin, are easily handled with such treatment and give good results. Serial sections were cut at thicknesses of 15, 10 and 5 μ, 10 μ apparently being most satisfactory. Practically all the slides were stained with Haiden-

SUMMARY OF ANTARCTIC COLLECTIONS

Dates	Leader	Ships	Collector	Author Bot. Rept.	Herb.	Total sp.	New to Antarctic	New sp.	Region Explored
1839–43	Ross	Erebus Terror	Hooker f.	Hooker f. '45 Hooker & Taylor '44	Kew Boston	9	9	3	Cockburn I. Graham Land
1897–99	Gerlache de Gommery	Belgica	Racovitsa	Vainio '03	Turku	55	51	29	Graham Land
1898–00	Borchgrevink	Southern Cross	Hanson, et al.	Fries '02 Blackman '02	Oslo	4 4	3 1	1 0	S. Victoria Land
1901–03	Drygalski	Gauss		Zahlbruckner '06		3	0	0	K. Wilhelm II Land
1901–03	Nordenskjöld	Antarctic	Skottsberg	Darbishire '12	Stockholm	47	19	9	Graham Land
1901–04	Scott	Discovery		Darbishire '10	Brit. Mus.	24	12	5	S. Victoria Land
1902–04	Bruce	Scotia	Rudmose-Brown	Darbishire '05		11	6	0	Graham Land
1903–05	Charcot	Français	Charcot Turquet	Hue '08	Paris	16	6	4	Graham Land
1907–09	Shackleton	Nimrod	Priestley	Darbishire '23	Brit. Mus.	15	1	1	S. Victoria Land
1908–10	Charcot	Pourquoi Pas	Gain Liouville	Hue '15	Paris	112	93	89	Graham Land
1910–11	Amundsen	Fram	Prestrud	Unpublished	Oslo	. .	. .	. .	S. Victoria Land
1910–11	Scott	Terra Nova		Darbishire '23	Brit. Mus.	17	8	8	S. Victoria Land
1911–14	Mawson	Aurora		Cheel	Adelaide				S. Victoria Land
1914–16	Shackleton	Endurance		Darbishire '23	Brit. Mus.				Weddell Sea
1928–30	Byrd	E. Bolling City of N. Y.	Gould?		U. Mich.?				K. Edward VII Land S. Victoria Land
1933–35	Byrd	J. Ruppert Bear of Oakland	Siple Blackburn	Dodge & Baker '38	Mo. Bot. Gard.	89	84	84	Marie Byrd Land K. Edward VII Land S. Victoria Land

hain's iron-alum haematoxylin with a counter stain of phloxine (a 1 per cent solution in 95 per cent alcohol). Such slides served as the basis of the morphological studies.

For the series showing the ascus development from young to mature stages, small apothecia or portions of larger apothecia were moistened with a weak solution of potassium hydroxide, washed in water, and mounted in lacto-phenol to which was added 10–20 drops of 1 per cent acid fuchsin and 1 drop of cotton blue according to Maneval ('36). The mounts were crushed slightly to spread out the thecial elements. Nuclei often show clearly after such treatment, but all nuclear details illustrated were either taken from or substantiated by similar details found in the permanent slides. All habit sketches were drawn with the aid of a binocular dissecting microscope at suitable magnifications. An Abbé camera lucida was used for all other drawings.

Measurements expressed in millimeters were made by means of a micrometer disc inserted in the 17× ocular of a binocular dissection microscope calibrated for the various objectives. Measurements expressed in microns were based on a range of sizes secured from both whole mounts and permanent slides. In many instances, scarcity of material prevented more than a single sample of each mount, thereby limiting ranges to two or even one apothecium. Additional collections therefore might easily modify the sizes as here recorded. Figures given in parentheses indicate a single exception. Measurements for the algae are for single cells unless a colony is specified.

Measurements of the ascus were taken from the longest and broadest points of each. In illustrating the developmental series the youngest stage observed, the stage at which the gelified sheath appears, a stage of the developing spores, and the mature ascus were usually figured. All asci and spores were drawn at a common magnification. Throughout the material, the asci show a protective gelified sheath varying from thick to thin as shown by pl. 44, fig. 99; pl. 46, fig. 136; pl. 53, figs. 262, 267. Such a sheath apparently is not of rare occurrence in lichens of the temperate regions but seems to be rarely recorded (cf. Nannfeldt, '32, p. 68). It appears to be somewhat thicker than those we have observed from the temperate zone. Although the ascus is a stable organ, a comparison of forms makes it clear that more than agreement of overall dimensions is necessary to establish the identity of asci. Ascospore sizes are given for the largest to the smallest noted.

MORPHOLOGY

The structural diagrams are figured on too small a scale to show individual cells, and consequently the types of tissue composing cortex and medulla are diagrammatic and standardized. Such figures are augmented by details of distinctive tissues on an enlarged scale. The terminology has been based on that of Hue as given in Smith ('21).

CORTEX

Intricate, not clearly represented in our species.

Fastigiate, e. g. in *Lecanora Siplei* (pl. 47, fig. 151) and *Buellia floccosa* (pl. 57, fig. 334).

Decomposed, not common but found in *Protoblastenia aurea* (pl. 52, fig. 230).

Pseudoparenchymatous (plectenchymatous), the most common type of cortex in these lichens, varying from a very compact tissue to occasional scattered cells, the latter usually large and fuscous, e. g. *Lecidea cancriformis* (pl. 41, fig. 48) and *Polycauliona sparsa* (pl. 54, fig. 281) for the compact types, and *Umbilicaria rugosa* (pl. 44, fig. 104) and *Buellia alboradians* (pl. 56, fig. 322) for the loose, scattered types.

Fibrous, most commonly found in the lower cortex as in *Parmelia Coreyi* (pl. 50, fig. 202) and *P. griseola* (pl. 50, fig. 206) but sometimes found in the upper cortex as in *Lecidea Siplei* (pl. 39, fig. 25).

MEDULLA

Felted, the most frequent type ranging from very loose and arachnoid to more or less reticulate networks, e. g. *Candelariella albovirens* (pl. 49, fig. 180a) and *Protoblastenia flava* (pl. 52, fig. 228).

Cretaceous or tartareous, not found in our species.

Cellular, e. g. *Candelariella chrysea* (pl. 49, fig. 182).

LOWER CORTEX

Repetition of the upper cortex, common when a continuous cortex is present.

Close parallel hyphae, rare, sometimes fibrous as in *Parmelia* sect. *Physcioideae* (pl. 50, figs. 202 and 206) or vertical as in *Buellia dendritica* (pl. 59, fig. 362).

Completely lacking, the usual case in crustose lichens, e. g. *Lecidea capsulata* (pl. 38, fig. 12b), *Sarcogyne grisea* (pl. 46, fig. 133), and *Buellia flavoplana* (pl. 55, fig. 297).

Only Chlorophyceae have been found as symbionts, although the Myxophyceae are represented as free-living algae growing in patches on rocks and thalli of lichens and as endogenous cephalodia in a few species. Two species of Collemaceae have been reported from Antarctica: a very depauperate *Collema crispum?* by Hooker from Cockburn Island, and *Leptogium puberulum* by Hue from King George Island in the South Shetlands. In the austral family Stictaceae where species with blue-green symbionts are abundant in Tierra del Fuego and the Falkland Islands, only *Sticta endochrysea* (with protococcoid symbiont) has been found at Cape van Beneden, Danco Land, 64°41′ S. As Forssell ('85) and Hue ('11) have pointed out, the lichens with protococcoid symbionts seem to be a much older group. Hence it is possible that we are dealing with a very ancient flora which has survived in the Antarctic and that the more recent groups with blue-green symbionts have not been able to penetrate. In Marie Byrd Land and probably in South Victoria Land, the species have been isolated so long that endemic species have developed but few new genera. In the Arctic, the Collemaceae reach northern latitudes corresponding to the southern latitude of Marie Byrd Land and are abundant in genera and species even in East Greenland where environmental conditions seem to be similar to those of Graham Land and Marie Byrd Land.

Usually the algal symbiont is much less abundant than in species of the same genera from more temperate climates. In many species the algal cells are more or less scattered throughout the medulla rather than organized in a definite layer below said, created a scarcity of that article at Cairo, owing to the enormous supply which the cravings of the young animal required, whilst under the fostering care of our excellent Chargé d'Affaires the Hon. Mr. Murray; to whom, after the princely donor, Abbas Pacha, zoologists at home are chiefly indebted for the present opportunity of studying this most remarkable and interesting African mammal, of which no living specimen has been seen in Europe since the period when they were last exhibited by the third Gordian in the Amphitheatre of Imperial Rome.

I remain, my dear Sir, yours very faithfully,

Richard Taylor, Esq., F.L.S. &c. RICHARD OWEN.

METEOROLOGICAL OBSERVATIONS FOR APRIL 1850.

Chiswick.—April 1. Overcast: rain. 2. Cloudy: clear. 3. Fine: showery at night. 4. Boisterous, with rain. 5. Cloudy and rather boisterous: fine: clear. 6. Overcast. 7. Cloudy and fine. 8. Foggy: overcast: slight showers. 9. Cloudy. 10. Very fine. 11. Rain: showery: overcast. 12. Fine: hot sun: thunder commenced ¼ past 12 noon: overcast at night. 13. Hazy: rain. 14. Hazy: rain at night. 15. Rain: very heavy rain in forenoon: cloudy. 16. Showery. 17. Low white clouds: fine throughout. 18. Clear: very fine. 19. Rain. 20. Showery. 21. Slight rain: cloudy. 22. Fine: clear. 23. Overcast: cloudy. 24. Clear: fine. 25. Fine: overcast and cold: clear at night. 26. Cloudy and cold. 27. Fine, but cold. 28, 29. Cloudy: fine, but cold, with excessively dry air. 30. Fine: cloudy.

Mean temperature of the month	48°·41
Mean temperature of April 1849	44 ·29
Mean temperature of April for the last twenty-four years ...	47 ·53
Average amount of rain in April	1·46 inch.

Boston.—April 1. Cloudy. 2. Cloudy: rain P.M. 3. Fine. 4. Cloudy: rain A.M. 5. Cloudy. 6. Cloudy: rain P.M. 7. Cloudy. 8. Cloudy: rain A.M. and P.M. 9. Cloudy: rain P.M. 10. Fine. 11, 12. Cloudy. 13. Cloudy: rain P.M. 14. Cloudy. 15. Cloudy: rain early A.M. 16. Cloudy: rain A.M. and P.M. 17. Cloudy: rain. 18. Fine. 19. Cloudy: rain A.M. 20, 21. Cloudy: rain P.M. 22. Cloudy. 23. Cloudy: rain. 24. Cloudy. 25. Fine. 26—28. Cloudy. 29. Cloudy: rain P.M. 30. Cloudy.

Applegarth Manse, Dumfries-shire.—April 1, 2. Rain, moderate. 3. Rain: mild: heavy P.M. 4. Rain heavy during night: drizzling throughout the day. 5. Rain in the night: dry and windy. 6. Heavy showers all day. 7. Rain: cleared P.M. 8. Rain. 9. Slight shower. 10. Rain in the night. 11. Frost: clear sunshine. 12. Fine day. 13. Fine A.M.: cold and windy P.M. 14. Strong cold east wind. 15. Rain and high wind. 16. Fair and fine: slight drizzle P.M. 17. Fine: shower heavy P.M. 18. Mild: growing shower. 19. Rain early A.M.: fair day. 20. Rain early: showery day. 21. Fair and fine. 22. Cold and clear. 23. Cold and clear: slight frost. 24. Cold and clear: frost A.M. 25. Rain and wind: boisterous. 26. Fair: cold. 27. Fair: clear and cold. 28. Fair A.M.: slight shower P.M. 29. Frost early. 30. Cold: a few drops of rain.

Mean temperature of the month	46°·3
Mean temperature of April 1849	42 ·3
Mean temperature of April for the last twenty-eight years .	44 ·3
Rain in April 1849	2·52 inches.
Rain in April for twenty-three years	1·76 inch.

Sandwick Manse, Orkney.—April 1. Fog: damp. 2. Cloudy: rain. 3. Damp. 4. Rain. 5. Drizzle. 6. Cloudy: hazy A.M. 7. Cloudy: drops A.M. 8. Rain: cloudy. 9. Drizzle: showers. 10. Hazy: clear. 11. Drops: damp. 12. Bright: fine. 13. Cloudy: clear. 14. Clear: cloudy. 15. Drizzle: cloudy. 16. Rain: cloudy. 17. Cloudy. 18. Showers: bright: cloudy. 19. Cloudy: showers: cloudy. 20. Bright: cloudy. 21. Cloudy: drops. 22. Bright: clear. 23, 24. Cloudy. 25. Bright: clear. 26. Cloudy: drops. 27. Clear: fine. 28. Cloudy: fine. 29, 30. Drops: cloudy.

fig. 407). In several cases, prepared slides revealed extensive patches of bacteria limited to the basal regions of the lichen among the material of the substrate (pl. 39, fig. 18). While no attempts have been made to cultivate these bacteria, we are reminded of the interesting observations of Cengia-Sambo ('23, '26), in which the nitrogen-fixing *Azotobacter* was reported growing with *Nostoc* in the thalli of various species of *Collema.* Sometimes the large dark areas covering mosses proved to be species of *Nostoc, Rivularia,* and *Scytonema.*

A dead skua gull, placed in a box in Antarctica, was considered to be relatively free from secondary infection, since it was unopened until it reached this laboratory. Portions of the bird, partially decomposed, were placed in sterile moist chambers at room temperature and at 9–10° C. in the refrigerator in an effort to determine what fungi were present. *Scopulariopsis brevicaulis* (Sacc.) Bain., a common organism in fingernails and other substances containing keratin, developed abundantly in all cultures (pl. 62, figs., 404, 405). Species of *Botrytis* (pl. 62, fig. 406) and *Penicillium* also developed abundantly.

BIBLIOGRAPHY

Blackman, V. H. 1902. Lichenes. Report on the collections of natural history made in the Antarctic regions during the voyage of the Southern Cross, 1898–1900. p. 320. London.

Cengia-Sambo, M. 1923. Polysimbiosi nei licheni a cianoficee e significato biologico dei cefalodi. Note di biochimica dei licheni. Atti Soc. Ital. Sci. Nat. Mus. Civico Stor. Nat. Milano **62**: 226–238.

————, 1926. Ancora della polisimbiosi nei licheni ad alghe cianoficee i batteri sinbionti. *Ibid.* **64**: 191–195.

Darbishire, O. V. 1905. The lichens of the South Orkneys. Trans. & Proc. Bot. Soc. Edinburgh **23**: 105–111. *pl. 3.*

————, 1910. Lichenes. National Antarctic Expedition. Natural History **5**: 1–11. *pl. 1.*

————, 1912. The lichens of the Swedish Antarctic Expedition. Wiss. Ergebn. Schwed. Südpolar-Expedition, 1901–1903. **4**^{11}: 1–74. *2 pl.*

————, 1923. Lichens. British Antarctic ("Terra Nova") Expedition, 1910. Nat. Hist. Rept. Bot. 29–76. *2 pl.*

————, 1923. Cryptogams from the Antarctic. Jour. Bot. Brit. & For. **61**: 105–107. *2 fig.*

Forssell, K. B. J. 1885. Anatomie und Systematik der Gloeolichenen. Nova Acta R. Soc. Sci. Upsal. III. **13**: 1–118.

Fries, Th. M. 1902. Lichenes antarctici. Nyt Mag. Naturvidensk. **40**: 208–209.

Hooker, J. D. 1845. The cryptogamic botany of the Antarctic voyage of H. M. discovery ships Erebus and Terror in the years 1839–1843, under the command of. . . . James Clark Ross. I–IV. 1–258. *pl. 1–198.* (Lichens, pp. 213–236.)

Hooker, J. D. and T. Taylor. 1844. Lichenes Antarctici; being characters and brief descriptions of the new lichens discovered in the southern circumpolar regions, Van Diemen's Land and New Zealand during the voyage of H. M. discovery ships Erebus and Terror. London Jour. Bot. [Hooker]**3**: 634–658.

Hue, A. M. 1908. Lichens. Expédition Antarctique Française (1903–1905) commandée par le Dr. Jean Charcot. 1–17. Paris.

————————, 1911. Monographiam generis Solorinae Ach. morphologice et anatomice addito de genere Psoromaria Nyl. appendice. Mém. Soc. Nat. Sci. Nat. Math. Cherbourg **38**: 1–56.

————————, 1915. Lichens. Deuxième Expédition Antarctique Française (1908–1910) commandée par le Dr. Jean Charcot. 1–202. *1 map.* Paris.

Maneval, W. E. 1936. Lactophenol preparations. Stain Technol. **11**: 9–11.

Nannfeldt, J. A. 1932. Studien über die Morphologie und Systematik der nichtlichenisierten inoperculaten Discomyceten. Nova Acta R. Soc. Sci. Upsal. IV. **8**^{2}: 1–368. *pl. 1–20.*

Smith, A. L. 1921. Lichens. i–xxviii, 1–464. *135 fig.* University Press, Cambridge. [cf. pp. 82–91.]

Vainio, E. A. 1903. Lichens. Résultats du voyage du S. Y. Belgica en 1897–1899. Expédition Antarctique Belge, Anvers. 1–46. *pl. 1–4.*

* Zahlbruckner, A. 1906. Die Flechten der Deutschen Südpolar-Expedition, 1901–1903. Deutsch. Südpolar Exp. 1901–1903. **8**: 21. *pl. 3–5.*

Zirkle, C. 1930. The use of N-butyl alcohol in dehydrating woody tissues. Science N. S. **71**: 103–104.

---

* Not seen.

VERRUCARIACEAE

Thallus crustose, epi- or endophloedal or more frequently saxicolous or terricolous, ecorticate; algae *Protococcus,* more rarely *Palmella* in *Staurothele* and *Thelenidia,* penetrating the perithecium which is simple, erect, sessile or with the base immersed, wall carbonaceous, entire or dimidiate, ostiole more or less prominent with a shield in *Aspidothelium* and *Aspidopyrenium;* asci mostly 8-spored, many-spored in *Trimmatothele;* paraphyses early gelified and evanescent in one tribe, persistent in the other; ascospores variable in color and septation.

Only *Verrucaria* (spores simple) and *Thelidium* (spores 2–4-celled) have been reported from the Antarctic. Eight species of the former from the Antarctic Archipelago and two (perhaps three) species of the latter are here reported from Marie Byrd Land.

THELIDIUM

THELIDIUM Massalongo, Framm. Lich. 15. 1855.

Phragmothele Clements, Gen. Fung. 39. 1909.

The type species was not designated. Of the four species originally placed here, Clements & Shear, Gen. Fung. 288. 1931, chose *T. amylaceum* Mass. *Phragmothele* was based on *P. papulare* (Fr.) Clem.

Thallus crustose, simple, ecorticate, poorly developed and often with the perithecia sessile on the crustose thalli of other lichens; algae *Protococcus;* perithecia simple, horny, carbonaceous, partly immersed or sessile; paraphyses early gelified and evanescent; asci saccate, 8-spored; ascospores ellipsoid or ovoid, hyaline or dark, 2–4-celled, commonly with a large oil droplet.

Two of our Antarctic species agree with the generic descriptions of *Thelidium,* except as to the color of the spores which are dark and the cells often of unequal size. While these differences may warrant the creation of a new genus, we prefer to leave these species in *Thelidium,* as *Verrucaria, Polyblastia,* and *Staurothele* also contain both colored and hyaline spores.

THELIDIUM **inaequale** Dodge & Baker, sp. nov.

Pl. 38, figs. 1–5.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-5.*

Areolae assimilantes minutae, granulares, gelifactae, cremeae, evanescentes; algis protococcoideis hyphisque paucis.

Perithecia 90–170 × 90–145 μ, abundantia, irregulariter elongata vel hemispherica, sessilia sed nonnumquam subtus attenuata, appressa, saxicola, sparsa vel gregaria, nigra, gelifacta madefacta, pseudoparenchymatica, cellulis pachydermaticis; hypothecium paraphysesque non visa; asci 30–38 × 21–23 μ, irregulares, saccati, e basi orientes; sporae octonae, 10–13 × 5–7 μ, uniseptatae, obtusae, constrictae, una ex cellulis majore quam altera, obscurae.

Assimilative areolae microscopic, rather gelatinous, granular, cream-colored, consisting only of algae abundant although small, and occasional hyphae, probably evanescent as the granules are rare on portions of the rock where the perithecia are abundant.

Perithecia 90–170 × 90–145 μ, distributed over areas of several square centimeters, abundant, sessile but sometimes more or less basally attenuated, closely attached to rocks, scattered or in clusters but never in very close contact, black, dull, rather gelified when moist, of thick-walled pseudoparenchymatous cells; hypothecium not extensive; asci apparently rising from the center of the base; paraphyses not seen; asci 30–38 × 21–23 μ, 8-spored, very irregular, saccate without a sheath or with a very thin one; ascospores 10–13 × 5–7 μ, 2-celled, blunt, slightly to much constricted at the septum, one cell frequently larger than the other, dark.

On biotite-sericite and sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-5;* Lichen Peak, *P. Siple & S. Corey 73-10.*

THELIDIUM **Caloplacae** Dodge & Baker, sp. nov.
Pl. 38, figs. 6–10.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-4.*

Perithecia sessilia vel basi subimmersa, ad 150 μ diametro, subspherica, nigra, carbonacea, laevia (sub lente irregularia); ostiola non bene evoluta, murus 20–50 μ crassitudine; cortex 10–40 μ, cellulis magnis, pachydermaticis, obscure brunneis vel nigris, media parte 10–15 μ crassitudine, pseudoparenchymatica, leptodermatica, strato interiore cellulis parvis numerosis ad ostiolam periphyses gignentibus; ostiola parva, centrica; thecium basale, paraphyses desunt; asci 42–50 × 15–19 μ, elongato-clavati, vaginati, polyspori; sporae 6.5–7 × 3–4 μ, bicellulares, brunneae.

Perithecia sessile on the host, thallus or base slightly immersed, up to 150 μ in diameter, subspherical, black, carbonaceous, macroscopically appearing smooth, microscopically somewhat irregular, ostiole poorly defined, small, central, wall 20–50 μ thick; cortex 10–40 μ thick, of large thick-walled cells, dark brown to black, middle layer 10–15 μ thick, of lighter-colored, thin-walled pseudoparenchyma, innermost layer lining the perithecial cavity, of numerous small cells, better developed near the ostiole where they fray out into more or less periphysis-like structures; thecium basal, paraphyses absent; asci 42–50 × 15–19 μ, elongate-clavate with a prominent sheath, many-spored; spores 6.5–7 × 3–4 μ, 2-celled, not constricted at the septum, more or less pointed to blunt, brown.

Parasitic on the thalli of *Gasparrinia Siplei* and *Kuttlingeria rufa,* growing over biotite sericite and orthoclase-sericite-siderite schist.

The systematic position of this species is uncertain, as it is not clear whether the algae in the vicinity of the perithecia belong to the parasite or to the host. If the latter view is correct, it may belong in *Amphisphaeria* Ces. & Ntrs.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-2, DW-4,* type; Skua Gull Peak, *P. Siple & S. Corey 72W-6.*

THELIDIUM **parvum** Dodge & Baker, sp. nov.

Pl. 62, figs. 393–395.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-4.*

Thallus minimus, hyphis brunneis, 2–4 μ diametro; algis *Scytonema* et *Protococcus,* cellulis ad 12 μ diametro.

Perithecia ad 50 × 55 μ, subsphaerica, parva, obscure brunnea, ostiolata, muro subaspero, 7–10 μ crassitudine, cellulis compactis, obscuris, pachydermaticis, isodiametricis; paraphyses desunt, deliquescentes; asci 28–31 × 10–12 μ, subbasales, elongati, subclavati, evaginati; ascosporae octonae, 7.5–9 × 3–3.5 μ, uniseptatae, cellula una majore obtusoque, altera minora, subacuta, hyalinae.

Non-assimilative parts lacking, assimilative thallus extremely reduced, hyphae slightly brownish, 2–4 μ in diameter, surrounding miscellaneous algae principally *Scytonema* and *Protococcus* with cells up to 12 μ in diameter. Sometimes a few colonies of bacteria are present.

Perithecia up to 50 × 55 μ, subspherical, small, very inconspicuous dark brown, ostiolate above, wall somewhat rough, 7–10 μ thick, of compact dark cells, thick-walled, isodiametric; no paraphyses seen, probably deliquescing early, leaving gelified slimy strands among the asci which are 28–31 × 10–12 μ, more or less limited to the basal region, elongate, somewhat clavate, 8-spored, without a gelified sheath; ascospores 7.5–9 × 3–3.5 μ, 2-celled, not constricted at the septum, one cell larger and blunt at the end, the other smaller, more pointed, each cell uninucleate, hyaline.

The symbiotic relations and hence the systematic position of this species are puzzling. The fungous hyphae seem to be involving two groups of algae, either as parasites or symbionts and growing over the thallus of *Parmelia variolosa,* on sandy loam from leucogranite. As in *T. Caloplacae,* we have preferred to leave this species with the lichens until more is learned of its life history.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-4.*

LECIDEACEAE

Thallus crustose, simple or with effigurate margins, continuous, areolate to squamulose (in *Lecidea* sect. *Psora)* and dwarf-fruticose (in *Sphaerophoropsis),* attached to the substrate by the hyphae of the hypothallus or of the medulla without differentiated rhizinae, often decorticate, ecorticate, or with an incomplete cortex of fasciculate thick-walled hyphae, never pseudoparenchymatous; algal layer of *Protococcus* cells, rarely producing many cells in a colony before the wall disappears, giving somewhat the appearance of a *Gloeocapsa;* medulla loosely woven with basal layer not differentiated or suggesting the structure of the upper cortex. Apothecia round, sessile, occasionally immersed or with a very short stalk, with parathecium hyaline or carbonaceous, not surrounded by an amphithecium nor including medullar tissue; hypothecium hyaline to carbonaceous; paraphyses usually simple, but branched in most of our Antarctic species, either free or imbedded in a gel; asci usually 8-spored, only exceptionally with fewer than 8 in *Mycoblastus* and *Megalospora,* or more (16–32 in a few species of *Lecidea* and *Bacidia);* ascospores usually hyaline, rarely brown *(Rhizocarpon),* of a variable number of cells, with or without a gelified sheath. Spermagonia immersed, spermatia elongate-ellipsoidal to cylindrical.

KEY TO ANTARCTIC GENERA

Spores unicellular..*Lecidea*
Spores 2-celled, under 30 μ long.
  Spores without a conspicuous sheath, long, hyaline....................*Catillaria*
  Spores with a conspicuous sheath, hyaline or brown.................*Catocarpon*
Spores several-celled, usually finally muriform, with a conspicuous sheath......
....*Rhizocarpon*

LECIDEA

LECIDEA Acharius, Meth. Lich. 32. 1803.

No type species was designated.

Thallus crustose, simple, continuous, areolate, verrucose or squamulose (in sect. *Psora),* attached to the substrate by hyphae of the hypothallus or of the medulla, without true rhizinae, ecorticate or with a thin cortex, sometimes sorediose, very rarely with true soralia or cephalodia; algae *Protococcus.* Apothecia round or angled by mutual pressure, exceptionally slightly elongate, immersed, sessile or very short-stalked, with hyaline, colored, or black parathecium of closely woven hyphae, epithecium bright or black; hypothecium hyaline, colored or carbonaceous; paraphyses unbranched in most temperate species but often branched in the Antarctic ones, with more or less thickened and capitate tips, free or imbedded in a gel; asci usually 8-, rarely 16-, spored; ascospores hyaline, unicellular, small, spherical, ovoid, ellipsoid or allantoid, straight or somewhat curved with a thin wall (or thickened with more or less of a sheath in the Antarctic species). Spermogonia immersed with a dark mouth, spherical, spermatia short-cylindric to filiform, straight or curved.

This large genus of the cold and temperate zones is usually divided into three sections often recognized as genera: *Eulecidea,* thallus simple, parathecium carbonaceous; hypothecium either carbonaceous or hyaline, of the colder regions; *Biatora,* thallus simple, parathecium and hypothecium never carbonaceous, varying from hyaline to colored, of the temperate regions; and *Psora,* thallus squamose, margin effigurate, parathecium either colored or black, mostly in the warmer, semiarid regions. Of these, two species of *Psora* have been reported from the Antarctic Archipelago, five species of *Biatora* from Louis Philippe and Graham Lands and twelve species of *Eulecidea,* of which two have been found in South Victoria Land, the rest from the Antarctic Archipelago.

KEY TO ANTARCTIC SPECIES

- Thallus not effigurate, uniform.
  - Apothecia bright-colored, not carbonaceous........BIATORA
    - Thallus flesh-color........*L. lavae*
    - Thallus white........*L. poeciloderma*
    - Thallus yellowish, granulose........*L. theiochroa*
    - Thallus pale straw-color, areolate.
      - Margin of thallus black........*L. monocarpa*
      - Margin of thallus concolorous........*L. acervuligera*
  - Apothecia black, carbonaceous........EULECIDEA
    - Thallus deep grayish, brown or fuscous.
      - Spores less than 10 μ; hypothecium hyaline; thallus fusco-rufous........*L. brunneoatra*
      - Spores more than 10 μ.
        - Apothecia 1 mm. or more.
          - Thallus thick, hypothecium black........*L. atrobrunnea*
          - Thallus thin, poorly developed........*L. fuscoatra*
        - Apothecia less than 1 mm.; thallus 0.4–0.5 mm.
          - Thallus grayish........*L. cinericia*
          - Thallus brownish........*L. rufonigerrima*
    - Thallus citrine drab to pale olive buff........*L. Blackburni*
    - Thallus white to pale yellowish, sometimes stained ferruginous when growing over ferriferous rocks.
      - Apothecia over 2 mm. in diameter........*L. auriculata*
      - Apothecia up to 1.5 mm. in diameter........*L. cancriformis*
      - Apothecia 1 mm. or less in diameter.
        - Hypothecium dark fuscous to brown.
          - Spores 10–16 × 5–8 μ; hypothecium 100–150 μ.
            - Cortex not differentiated; apothecia 0.315 mm.; thecium 60 μ; paraphyses 0.5–1.5 μ, tips 2 μ........*L. ecorticata*
            - Cortex 30–60 μ; apothecia 0.6–1.0 mm.
              - Thecium 100–120 μ; paraphyses 5–6 μ, tips not thickened........*L. cremoricolor*
              - Thecium 140–160 μ; paraphyses 3 μ, tips furcate......*L. sciatrapha*
          - Spores 7.5–10 μ long; epithecium K green.
            - Spores 2–3 μ in diameter; thecium 30–40 μ; asci short-clavate, base not attenuate, 24–28 (–32) × 12.5–14 μ........*L. Coreyi*
            - Spores 5–6 μ in diameter; thecium 60 μ........*L. rupicida*
          - Spores 6–8.5 μ long; epithecium K green.
            - Spores 1.7–2.5 μ in diameter.

Asci 25–42 μ, inflated above, attenuate below; hypothecium 100 μ with long strands penetrating the medulla..*L. cancriformis*

Asci (37–) 52–60 μ, not inflated; hypothecium 60–70 μ, not penetrating the medulla........................*L. Blackburni*

Spores 3.5–5 μ in diameter; asci 23–31 × 6–9 μ.............*L. Painei*

Hypothecium hyaline.

Spores 10–20 μ long.

Spores 3–5 μ in diameter; asci (20–)32–40 × 12.5–16 μ; thecium 60–70 μ; epithecium K green.........................*L. Wadei*

Spores 5–8.5 μ in diameter.

Paraphyses 1.0–1.5 μ, not capitate; epithecium K–; asci 30–44 × 14–16(–20) μ..................................*L. Byrdii*

Paraphyses 0.75–1.0 μ, capitate; epithecium K green; asci (41–)48–62(–70) × 15–18 μ.........................*L. Siplei*

Paraphyses 3–4 μ, not capitate.......................*L. eburnea*

Spores 7–11 μ long.

Spores 5–6 μ in diameter; epithecium K–; thecium 55–60 μ.

Apothecia 0.3–0.5 mm.; spores 8–10 μ long.............*L. rupicida*

Apothecia 0.675 mm.; spores 10–11 μ long...............*L. Byrdii*

Spores 3–5 μ in diameter; epithecium K green.

Thecium 50–60 (–70) μ; apothecia 0.225 mm.; paraphyses 0.75–1–1.5 μ, not capitate...........................*L. capsulata*

Thecium 70 μ; apothecia 0.60 mm.; paraphyses 1.5–2.5 μ, capitate, heads 4–5 μ...........................*L. Stancliffi*

Thallus effigurate; apothecia black; hypothecium hyaline..................PSORA

Thallus cupreous to dark chestnut, non-assimilative thallus slightly developed, fibrillose..*L. placodiiformis*

Thallus light yellow to light chestnut, with a broad black non-assimilative border...*L. physciella*

LECIDEA **Siplei** Dodge & Baker, sp. nov.

Pl. 39, figs. 22–28; pl. 63, fig. 410.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-4.*

Thallus plus minusve continuus, ad 1.5 cm. diametro, areolae ad 1.8 mm., deinde diffractae, granulosae vel verrucosae, gelifactae madefactae, albae vel griseae, in solo una cum muscis; cortex 10–30 μ crassitudine, hyphis periclinalibus, extremis emortuis gelifactis amorphisque; stratum gonidiale ad 85 μ crassitudine, cellulis singulis 10–11 μ diametro; medulla ad 450 μ crassitudine, hyphis reticulatim laxeque intertextis; stratum basale non bene evolutum, paullo densius obscuriusque.

Apothecia ad 0.9 mm. diametro, maturitate convexa, marginibus juventute inflexis, irregulariter spherica, sparsa vel gregaria, carbonacea, marginibus 10–20 μ, cellulis obscuris fastigiatis; parathecium 20–40 μ, cellulis obscuris, fastigiatis isodiametricisve, subtus tenuescens et cum cortice mergens; hypothecium 50–70 μ, hyalinum, pseudoparenchymaticum, non in lateribus tenuescens, basaliter in medullam filamentosam cellulis tenuibus laxe implexis ad 100 μ crassitudine mergens, totam super medullam areolarum; thecium 50–100 μ altitudine; paraphyses 0.75–1.0 μ, apicibus inflatis, 1–1.5 μ, raro ramosi, graciles, septati, epithecium ad 15 μ crassitudine, carbonaceum; asci (41–)48–62(–70) × 15–20(–22) μ, elongati, graciles, clavati, conspicue vaginati; ascosporae octonae, 10–14 × 5.0–8.5 μ, hyalinae, late ellipsoideae, raro subovoideae, unicellulares.

Thallus more or less continuous over areas of a few mm. to 1.5 cm., broken up into areolae up to 1.8 mm., crustose with secondary cracks, granulose to verrucose, gelified when wet, white or grayish, on soil with mosses; cortex 10–30 μ thick, of periclinal hyphae, the outer ones dying, becoming gelified and amorphous; algal layer up to 85 μ thick, cells occurring singly, 10–11 μ in diameter; medulla up to 450 μ thick, of reticulate hyphae loosely interwoven; basal cortex scarcely differentiated, here and there slightly denser and darker.

Apothecia up to 0.9 mm. in diameter, convex at maturity, often with inrolled margins when young, irregularly spherical, sessile, scattered or gregarious, carbonaceous; exciple 10–20 μ, of dark fastigiate cells; parathecium 20–40 μ, of dark fastigiate or isodiametric cells, thinning below and merging with the thalline cortex; hypothecium 50–70 μ thick, of hyaline pseudoparenchyma, not thinning laterally, basally passing into a filamentous medulla of very fine, loosely arranged cells for about 100 μ before merging with the coarser reticulate medulla of the assimilative areolae; thecium 50–100 μ high; paraphyses 0.75–1.0 μ, expanding to 1–1.5 μ at the tips, rarely branched, fine, septate, apices delicately inflated, united into a carbonaceous layer, small bits of which often cling to the outer surfaces, heads small, gelified, not darkened, epithecium up to 15 μ thick, carbonaceous; asci (41–)48–62(–70) × 15–20(–22) μ, 8-spored, elongate, slender, clavate with a conspicuous gelified sheath; ascospores 10–14 × 5.0–8.5 μ, hyaline, broadly ellipsoid to somewhat ovoid, 1-celled.

On loose sandy soil from biotite-sericite, sericite-orthoclase schist, and orthoclase-sericite-siderite schist.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-1, DW-3;* Stancliff Mt., *P. Siple & S. Corey 72A-1;* Skua Gull Peak, *P. Siple & S. Corey 72W-4*, type; Lichen Peak, *P. Siple & S. Corey 73-3, 73-4, 73-7.*

Lecidea **Wadei** Dodge & Baker, sp. nov. Pl. 39, figs. 18–21.

Type: Marie Byrd Land, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-6.*

Thallus parvus, inconspicuus, in solo inter muscos, areolatus vel granulosus, gelifactus madefactus, albus vel pallide stramineo-flavus; cortex superior evanescens, paucis cellulis obscuris relictis, superficie thalli catervis cellularum emortuarum tecta; stratum gonidiale variabile, coloniis compactis, numerosis, sparsis; medulla ad 150 μ crassitudine, hyphis circa 1 μ diametro, reticulatim laxeque dispositis; stratum basale male evolutum, subamorphum gelifactumque cum bacteriis algisque extraneis.

Apothecia circa 0.675 mm., raro ad 0.9 mm. diametro, irregulariter hemispherica, juventute applanata, sessilia, sparsa vel gregaria, carbonacea; parathecium 20–30 μ crassitudine, paucis cellulis fastigiatis, exteris obscuris, cum epithecio mergens; hypothecium 20–30 μ, hyalinum, hyphis tenuibus, compactis, basaliter cum medulla mergens; thecium ad 60 μ altitudine; paraphyses 0.75–1.0 μ, apicibus ad 2 μ diametro, tenuissimi, vaginati, epithecium 8–10 μ crassitudine, KOH addito viridescens, obscuri; asci 32–40 × 12.5–16 μ, obtuse clavati, apicibus vaginatis; ascosporae octonae, 11–14 × 3–5 μ, elongato-ellipsoideae, juventute subsphericae, vaginatae, hyalinae, unicellulares.

Thallus scant, only a few mm. in diameter, inconspicuous, on soil among mosses, areolate to granulose, gelified when moist, white to pallid straw yellow; upper cortex poorly represented by occasional dark fastigiate cells, rarely more than one cell thick, outer surface usually decorticate, covered by extensive masses of dead cells; algae in compact groups in the upper portions of the thallus, surrounded by hyphae more closely united than in the medullar tissue, numerous; medulla up to 150 μ thick, of loosely reticulate hyphae about 1 μ in diameter; basal cortex not differentiated, but with a distinct basal zone from 40 to 300 μ thick, structure indistinct, almost amorphous, perhaps gelified, in the upper portions with a few medullar hyphae which can still be traced, abundantly packed with clumps of bacteria and a few algae.

Apothecia about 0.675 mm., rarely up to 0.9 mm. in diameter, irregularly hemispheric, flatter when young, sessile on the assimilative thallus, scattered or gregarious, carbonaceous; parathecium 20–30 μ thick, of a few fastigiate cells, darkened on the outside, merging with the epithecium; hypothecium 20–30 μ thick, hyaline, of slender compact hyphae, not thinning laterally, basally uniting with the medulla which is truly reticulate and filamentous; thecium up to 60 μ tall; paraphyses 0.75–1.0 μ in diameter, expanding above to 2 μ, covered by a sheath but the sheath not much darkened nor expanded at the tip, very slender, septate, unbranched or branched, the whole forming a rather gelified mass; epithecium 8–10 μ, turning green with KOH, dark; asci 32–40 × 12.5–16 μ, 8-spored, bluntly clavate at maturity with a well-developed apical sheath; ascospores 11–14 × 3–5 μ, nearly spherical when young, elongate-ellipsoidal at maturity, covered with a delicate sheath which is more prominent in immature spores, hyaline, unicellular.

Among mosses on loose sandy loam from leucogranite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-6.*

LECIDEA **capsulata** Dodge & Baker, sp. nov.
Pl. 38, figs. 11–17.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Stancliff, *P. Siple & S. Corey 72A-2.*

Thallus sparsus in areis 1–3 cm. diametro, saxicola, floccosus vel arachnoideus, plus minusve continuus; areolae ad 0.45 mm. diametro, irregulares, albae vel ''cartridge buff'' aut ochraceae a saxis ferriferis tinctae; cortex deest vel paucis cellulis fastigiatis relictis; stratum gonidiale ad 50 μ crassitudine, coloniis parvis paucisque, sparsis; medulla hyphis laxe reticulatimque contexta, 1 μ diametro; stratum basale non evolutum.

Apothecia ad 0.225 mm. diametro, irregulariter circularia, applanata vel concava, marginata, juventute subcyathiformia, sessilia, sparsa, nigra, nitida; parathecium ad 40 μ crassitudine, cellulis magnis fuscis pachydermaticis, hypothecium theciumque circumdans; hypothecium ad 30 μ crassitudine, hyalinum vel subobscurum, hyphis tenuibus periclinalibus pachydermaticis; thecium ad 70 μ altitudine; paraphyses 0.75–1.5 μ diametro, septati, ramosi insuper, tenues, flexuosi, vaginati, epithecium 5–8 μ, obscurum, KOH addito virescens; asci (20–) 30–42 × 12–16 μ, breves, late clavati, vaginati; ascosporae octonae, 7–11 × 3–4.5 μ, hyalinae, ellipsoideae, vaginatae, unicellulares.

Thallus scattered over areas 1–3 cm. in diameter, on rocks, floccose to arachnoid and more or less continuous or of separate areolae scattered over the rock, individual areolae up to 0.45 mm. in diameter, irregular in shape, white to cartridge buff or stained by rust from the rocks; upper cortex evanescent except for an occasional group of fastigiate cells; algal layer up to 50 μ thick, of small and few scattered colonies; medulla of loose reticulate hyphae about 1 μ in diameter which are slightly more compact and abundant around the algae; no basal layer differentiated.

Apothecia up to 0.225 mm. in diameter, irregularly circular, flat or concave with a margin, especially so when young, almost cyathiform, sessile on the assimilative thallus, scattered, black and shining; parathecium highly developed, up to 40 μ thick, entirely surrounding the thecium and hypothecium, of large fuscous thick-walled cells in a palisade, forming the cortex as well, basally distinct from the medulla which is more compact below the apothecium but with the cells no larger in diameter; hypothecium up to 30 μ thick, even, thinning somewhat laterally and merging into the parathecium; thecium up to 70 μ tall; paraphyses 0.75–1.5 μ in diameter, septate, branched often more than once near the tip, slender, slightly flexuous with a thin sheath, neither much expanded nor darkened at the tip, epithecium 5–8 μ, dark, turning green with KOH; asci (20–)30–42 × 12–16 μ, 8-spored, short, broadly clavate with a conspicuous gelified sheath which is distinct from an early stage; ascospores 7–11 × 3–4.5 μ, hyaline, ellipsoidal with a conspicuous gelified sheath.

The specimen from Mt. Rea-Cooper has apothecia up to 0.65 mm. but agrees microscopically and grows on leucogranite.

On biotite-sericite, sericite-orthoclase schist, quartzite, and leucogranite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-3, DW-5;* Mt. Stancliff, *P. Siple & S. Corey 72A-1, 72A-2,* type; Lichen Peak, *P. Siple & S. Corey 73-10;* Chester Mts., *P. Siple & S. Corey 97A-3;* Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7.*

LECIDEA **Coreyi** Dodge & Baker, sp. nov. Pl. 40, figs. 29–34.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-6.*

Thallus paucis mm. diametro, bene evolutus, tenax, gelifactus madefactus, irregulariter areolatus, saxicola, albidus; cortex cellulis fastigiatis, non continuus, saepe cum strato cellularum emortuarum aut funiculis amorphis plus minusve periclinalibus; stratum gonidiale 55–60 μ crassitudine, coloniis minutis sparsisque, cellulis 7–8 μ diametro; medulla hyphis laxe reticulatimque implexis; stratum basale non bene evolutum, simile cortici sed crassius.

Apothecia ad 0.50 mm. diametro, subspherica, convexa, sessilia, singula vel caespitosa, carbonacea, nigra; parathecium ad 200 μ crassitudine, cellulis fuscis pachydermaticis, ad 5 μ diametro; hypothecium inconspicuum, 10–20 μ crassitudine cum parathecio continuum, cellulis pseudoparenchymaticis; thecium 30–40 μ altitudine; paraphyses 1–2.5 μ diametro, apicibus ad 2.5 μ, pachydermatici, septati, ramosi vel non-ramosi, vaginati, capitibus non obscuris vel incrustatis, epithecium 5–8 μ, nigrum, KOH addito viridescens; asci 24–28(–32) × 12.5–14 μ, parvi, breve clavati, vagina non prominente; ascosporae octonae, monostichae, elongato-ellipsoideae, late vaginatae, 7.5–10 × 2–3 μ.

Thallus scant, a few mm. at most in diameter, well developed, tough, gelified when moistened, irregularly areolate, on rocks, whitish; cortex of fastigiate cells, not continuous, often with a conspicuous layer of dead cortical cells covering the outer surface, seemingly built of amorphous strands, more or less periclinal; algal layer 55–60 μ thick, of small scattered colonies, cells 7–8 μ in diameter; medulla of loosely reticulate hyphae; basal layer not morphologically distinct from the cortex, although frequently a few layers thicker.

Apothecia up to 0.50 mm. in diameter, subspherical in outline, convex, not flattened, sessile on the assimilative areolae, single to closely clustered and heaped, carbonaceous, black; parathecium up to 200 μ thick, of heavy-walled fuscous cells up to 5 μ in diameter in a conspicuous concentric palisade, disappearing abruptly below into the thinner-walled hyaline cells of the medulla; hypothecium inconspicuous, 10–20 μ thick, continuous with the parathecium, of thick-walled fuscous cells nearly isodiametric; thecium 30–40 μ high; paraphyses 1–2.5 μ in diameter, expanding slightly to 2.5 μ at the tips, thick-walled, septate, branched or unbranched, gelified sheath prominent, tips not darkened or incrusted; epithecium 5–8 μ thick, dark turning green with KOH; asci 24–28(–32) × 12.5–14 μ, 8-spored, small, short-clavate, especially at maturity, sheath not prominent; spores monostichous, 7.5–10 × 2–3 μ, elongate-ellipsoidal with a broad sheath.

On coarse- or fine-grained crypto-crystalline pinkish-gray granite, sericite-orthoclase schist, and arkosic sandstone.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-6*, type; Mt. Grace McKinley, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff McK-2, McK-3, McK-5.*

LECIDEA **Byrdii** Dodge & Baker, sp. nov. Pl. 40, figs. 39–41.

Type: Marie Byrd Land, Edsel Ford Range, Garland Hershey Ridge, *P. Siple & S. Corey 5-2.*

Thallus parvus, sparsus, crustosus, areolatus, albidus; cortex non evolutus, superficies thalli strato cellularum emortuarum ad 20 μ crassitudine tecta; algae protococcoideae, ad 12 μ diametro, coloniis magnis per totum thallum dispositis; medulla hyphis tenuibus circa 2 μ diametro reticulatim dispositis, sub apotheciis verticaliter et plus minusve parallele dispositis; stratum basale non evolutum.

Apothecia ad 0.675 mm. diametro, irregularia, pulvinata, sessilia, nigra, carbonacea; parathecium non bene evolutum; hypothecium 20–30 μ crassitudine, non tenuescens, hyphis tenuibus dense reticulatis, hyalinum; thecium 40–60 μ altitudine; paraphyses 1–1.5 μ diametro, apicibus non inflatis, septati, raro ramosi, vaginati, epithecium 5–8 μ, carbonaceum, asperum; asci 30–44 × 14–20 μ, late clavati, obtusi, tenuiter vaginati; ascosporae octonae, 10–11 × 5–6 μ, late ellipsoideae, apicibus obtusis, juventute conspicue, maturitate tenuiter, vaginatae.

Thallus a few mm. in diameter, scattered, scant, crustose, areolate, whitish, closely attached to the rock; upper cortex lacking, the outer surface protected by a layer of dead cells as much as 20 μ thick; algae *Protococcus,* cells up to 12 μ in diameter abundant, in large colonies throughout the areolae; medulla of slender hyphae about 2 μ in diameter, closely anastomosed in loosely woven strands, near the surface hyphae more coarsely reticulate and apparently devoid of contents, medullar hyphae below the apothecia more or less parallel and vertical; lower cortex not differentiated.

Apothecia up to 0.675 mm. in diameter, irregularly circular in outline, pulvinate, sessile, black, carbonaceous; parathecium not differentiated beyond a few cells which merge with the marginal cells; hypothecium 20–30 μ thick, not tapering, of slender, closely reticulate hyphae, hyaline; thecium 40–60 μ tall; paraphyses 1–1.5 μ in diameter, tips not expanded, septate, rarely branched, with a thin gelified sheath and black incrustations adhering to the outer surfaces, epithecium 5–8 μ, carbonaceous, rough; asci 30–44 × 14–20 μ, 8-spored, broadly clavate, blunt on the ends, with a small gelified sheath; ascospores 10–11 × 5–6 μ, broadly ellipsoid, ends blunt, surrounded by a hyaline sheath which is especially prominent on the young spores but decreases with maturity.

MARIE BYRD LAND: Edsel Ford Range, Garland Hershey Ridge, *P. Siple & S. Corey 5-2.*

LECIDEA **ecorticata** Dodge & Baker, sp. nov.
Pl. 40, figs. 35–38.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7(1).*

Thallus minimus, 0.5 mm. diametro, pustularis, irregulariter areolatus, gelifactus madefactus, albus vel dilute olivaceo-alutaceus; cortex non evolutus; algae paucae, sparsae ad superficiem; medulla laxa, hyphis reticulatim dispositis; stratum basale cellulis fastigiatis obscuris.

Apothecia ad 0.315 mm., juventute concava, maturitate subconvexa, saepe submarginata, sparsa, sessilia, nigra, carbonacea; parathecium ad 25 μ, ad margines tenuescens, 5–10 μ; hypothecium ad 150 μ, obscurum, pseudoparenchymaticum; thecium ad 60 μ altitudine; paraphyses 0.5–1.5 μ crassitudine, graciles, apicibus ad 2 μ, non obscuris, ramosi vel non ramosi, vaginati, brunnei, gelifacti, epithecium 8–10 μ, obscurum; asci 40–48 × 19–22 μ, bulbosi, basi attenuato, vaginati; ascosporae octonae, 10–14 × 5–7 μ, ellipsoideae vel ovoideae, vaginatae, hyalinae, unicellulares.

Thallus small, not more than 0.5 mm. in diameter, pustular, irregularly areolate, gelified when moist, white to pale olive buff; upper cortex not differentiated; algae few, scattered near the upper surface; medulla of loose reticulately woven hyphae; basal cortex of darkened fastigiate cells sometimes extending into the medulla up to 30 μ.

Apothecia up to 0.315 mm. in diameter, concave when young to slightly convex at maturity, often with a slight rim, mostly scattered, sessile on the assimilative thallus; parathecium distinct up to 25 μ, tapering to 5–10 μ at the point of convergence with the epithecium; hypothecium up to 150 μ, tapering slightly from the center to the margin, dark, more or less pseudoparenchymatous; thecium about 60 μ tall; paraphyses 0.5–1.5 μ, slender, slightly expanded, the tips sometimes up to 2 μ, not darkened, branched or unbranched with prominent sheath, the whole rather gelified, brownish, epithecium 8–10 μ thick, dark; asci 40–48 × 19–22 μ, 8-spored, bulbous with a somewhat attenuate base, sheath prominent from early stages; ascospores 10–14 × 5–7 μ, ellipsoidal to ovoid with a distinct hyaline sheath, hyaline, unicellular.

On coarse-grained gray granite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7, R-7 (1),* type.

LECIDEA **Stancliffi** Dodge & Baker, sp. nov.

Pl. 40, fig. 42; pl. 41, figs. 43–45.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-10.*

Thallus parvus, 3–4 mm. diametro, plus minusve areolatus, albus vel cremeo-alutaceus; cortex ad 40 μ, cellulis obscuris fastigiatis irregularibus, saepe strato cellularum emortuarum ad 40 μ crassitudine tectus; stratum gonidiale 50–170 μ crassitudine, cellulis coloniisque subverticaliter dispositis; medulla ad 650 μ crassitudine, hyphis laxe reticulatimque implexis; stratum basale non evolutum sed hyphis medullaribus inferis subobscuris, non pachydermatiscens.

Apothecia ad 0.6 mm. diametro, circularia, applanata, marginata vel emarginata, gregaria vel caespitosa, nigra, nitida; parathecium non evolutum; hypothecium ad 30 μ, hyalinum, hyphis leptodermaticis periclinalibus compactis; thecium ad 70 μ altitudine; paraphyses 1.5–2.5 μ, apicibus obscuris, 4–5 μ, septati, ramosi, raro non ramosi, pachydermatici, epithecium ad 10 μ crassitudine, obscurum, subgelifactum, KOH addito dilute virescens; asci 36–45 × 14–15 μ, late clavati; ascosporae octonae, (7–)8–10.5 × 3.5–5(–6) μ, ovoideae vel subsphericae, vaginatae.

Thallus 3–4 mm. in diameter, scant, compact, more or less areolate, white to cream-buff; upper cortex up to 40 μ thick, of darkened fastigiate cells, at most a few rows deep and irregularly distributed, often covered by a conspicuous layer of dead cortical cells as thick as 40 μ; algal layer 50–170 μ thick, individual cells and small colonies more or less vertically arranged; medulla up to 650 μ thick, of loosely reticulate hyphae; basal layer not developed but the medullar hyphae somewhat darkened, not thickened.

Apothecia up to 0.6 mm. in diameter, more or less circular, usually flattened, with or without a differentiated margin, closely gregarious or heaped, black, shining; parathecium not differentiated beyond a few cells merging with the margin; hypothecium up to 30 μ, hyaline, not tapering, of thin-walled more or less periclinal hyphae closely united; thecium up to 70 μ tall; paraphyses 1.5–2-5 μ, expanding to 4–5 μ above, septate, branched or rarely unbranched, thick-walled, heads with darkened outer caps, epithecium up to 10 μ thick, dark, slightly gelified, turning slightly greenish with KOH; asci 36–45 × 14–15 μ, 8-spored, broadly clavate; ascospores (7–)8–10.5 × 3.5–5(–6) μ, ovoid to subspherical, with a prominent sheath.

On cemented particles of crypto-crystalline gray granite and weathered coarse pinkish or gray granite or on sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-10*, type; Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7;* Mt. Grace McKinley, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff McK-8.*

LECIDEA **cancriformis** Dodge & Baker, sp. nov.
Pl. 41, figs. 46–52; pl. 63, fig. 409.

Type: South Victoria Land, Queen Maud Mts., Scudder Mt., 86° 03′ S., 150° 40′ W., *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-6(2).*

Thallus areolatus, ad 0.5 mm. latitudine, funiculis plura apothecia gerentibus, griseo-albidus, gelifactus madefactus, irregularis, plus minusve verrucosus; cortex 2–8 μ crassitudine, brunneus, cellulis parvis fastigiatis ad 2 μ diametro et strato cellularum emortuarum ad 40 μ diametro; stratum gonidiale ad 100 μ crassitudine, cellulis protococcoideis ad 10 μ diametro; medulla ad 1200 μ crassitudine, hyphis ad 2 μ, ad basim verticaliter, insuper reticulatim, dispositis.

Apothecia ad 1.5 mm., irregularia, saepe angulata, convexa vel pulvinata, emarginata, gregaria, nigra, carbonacea, basi constricta; parathecium paucis cellulis in cortice mergens; hypothecium ad 100 μ crassitudine, irregulariter in medullam ad 450 μ penetrans, cellulis pachydermaticis, 2 μ diametro, obscure fusco-brunneis, subparallelis, verticaliter dispositis; thecium ad 70 μ altitudine; paraphyses 1.0–1.5 diametro, capitibus 3.0–4.0 μ diametro, non ramosi vel ramosi, pachydermatici, septati, epithecium ad 10 μ crassitudine, carbonaceum, superficie irregulari, KOH addito virescens; asci 25–42 × 8–12 μ, subtus attenuati, superne inflati; ascosporae octonae, subfasciculatae, 6.5–7.5 × 1.7–2.5 μ, ellipsoideae, una apice subacuta.

Thallus up to 0.5 mm. wide, usually in long strands bearing several apothecia, areolate, grayish white, gelified when moist, irregular in shape, more or less verrucose, small and inconspicuous in comparison with the apothecia; upper cortex 2–8 μ thick, brownish, of small fastigiate cells up to 2 μ in diameter which terminate the hyphae of the medulla, with a thick layer of dead cells on the surface up to 40 μ thick; algal layer up to 100 μ thick, of protococcoid cells up to 10 μ in diameter; medulla up to 1200 μ thick, of reticulately arranged hyphae up to 2 μ in diameter, more or less vertical toward the base of the areolae; lower cortex not differentiated.

Apothecia up to 1.5 mm. in diameter, irregularly circular becoming angled by mutual pressure, convex to pulvinate, emarginate, abundant, gregarious, black, carbonaceous, constricted at the base, subsessile to substipitate on the areolae; parathecium of a few cells which merge laterally with the marginal cortex; hypothecium up to 100 μ thick, extending irregularly into the medulla, occasionally as much as 450 μ, of dark fuscous brown cells about 2 μ in diameter, more or less parallel and vertical; thecium up to 70 μ tall; paraphyses 1.0–1.5 μ, expanding to heads 3.0–4.0 μ in diameter which are hyaline and incrusted with carbonaceous fragments unbranched or branched, thick-walled, septate, epithecium about 10 μ thick, carbonaceous, surface irregular, turning green with KOH; asci 25–42 × 8–12 μ, 8-spored, attenuate below, inflated above, giving a bulbous appearance to the mature ascus; ascospores subfasciculate, 6.5–7.5 × 1.7–2.5 μ, ellipsoidal, one end sometimes pointed.

On coarse-grained granite weathering reddish brown, and on fine-grained gray granite.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-8.*

SOUTH VICTORIA LAND: Queen Maud Mts., Scudder Mt., Station 9, 86° 03′ S., 150° 40′ W., *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-2, QM-6 (1), (2),* type, *(3), (4);* N.E. Durham Point, east portal Thorne Glacier, *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-3(84), QM-4(83).*

LECIDEA **Blackburni** Dodge & Baker, sp. nov.

Pl. 41, figs. 53–56.

Type: South Victoria Land, Queen Maud Mts., Scudder Mt., 86° 03′ S., 150° 40′ W., *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-6(2).*

Hypothallus paucis obscuris funiculis hypharum irregularum; cortex medullaque non evoluta, areas 4–5 mm. diametro dendritice tegens; areolae assimilantes ad 0.75 mm. diametro, irregulares, molles vel gelifactae madefactae, pallide olivaceo-alutaceae vel citrino-ravae; cortex 10–18 μ, cellulis parvis fastigiatis dilute vel obscure brunneis, strato denso amorpho cellularum emortuarum ad 20 μ crassitudine tectus; stratum gonidiale 80–100 μ crassitudine, cellulis ad 15 μ diametro confertis; medulla ad 850 μ crassitudine, hyphis 1–1.5 μ diametro reticulatim dispositis, circum algas densius; stratum basale non evolutum.

Apothecia 0.2 × 0.5 mm. aut ad 0.5 mm. diametro, irregulariter elliptica vel circularia, plus minusve applanata, marginata, sessilia, conferte gregaria sparsave, nigra, subnitida; parathecium paucis cellulis in corticem mergens; cortex marginalis bene evolutus, ad 25 μ crassitudine, cellulis magnis isodiametricis carbonaceis; hypothecium 60–70 μ, fusco-brunneum, ad margines tenuescens, pseudoparenchymaticum cellulis pachydermaticis; thecium 50–90 μ altitudine; paraphyses 1 μ, capitibus ad 3 μ, obscuris, non incrustatis, non ramosi vel ad apices ramosi, epithecium 8–12 μ, carbonaceum, asperum, KOH addito virescens; asci (37–)52–60 × 9–11 μ, elongato-clavati, non abrupte inflati ut in *Lecidea cancriformi;* ascosporae 6.5–8.5 × 2–2.5 μ, ellipsoideae, apicibus rotundatis.

Non-assimilative portion represented by a few black strands composed of dark, irregular hyphae, not distinguished morphologically into cortex and medulla, dendritic, extending over areas 4–5 mm. in diameter; assimilative portion up to 0.75 mm., irregularly areolate, soft to gelified when moist, pale olive buff to citrine drab; cortex 10–18 μ thick, of several layers of small fastigiate cells, light to dark brown in the outer layers, the whole covered by a layer of dead cells, amorphous, up to 20 μ thick; algal layer 80–100 μ thick, cells up to 15 μ in diameter, abundant and closely packed; medulla up to 850 μ thick, of slender hyphae 1–1.5 μ in diameter reticulately arranged, more compactly about the algae; lower cortex absent.

Apothecia 0.2 × 0.5 mm. or up to 0.5 mm. in diameter, irregularly elliptical to circular in outline, more or less flattened with a distinct margin, sessile, closely crowded or scattered, black, somewhat shining; parathecium consisting of a few cells merging with the marginal cortex which is well developed, up to 25 μ thick, of large isodiametric cells, carbonaceous, fusing with the epithecium above and the thalline cortex below; hypothecium 60–70 μ, fuscous brown, slightly tapering from the center to the margin, of thick-walled pseudoparenchyma; thecium 50–90 μ tall; paraphyses 1 μ, heads up to 3 μ, darkened, without incrustations, unbranched or branched near the apex, epithecium 8–12 μ thick, carbonaceous, rough, turning green with KOH; asci (37–)52–60 × 9–11 μ, 8-spored, long, slender-clavate, expanding gradually from the attenuate base and not abruptly as in *Lecidea cancriformis;* ascospores 6.5–8.5 × 2–2.5 μ, ellipsoidal, slender, with rounded ends.

On fine-grained gray and pinkish granite.

SOUTH VICTORIA LAND: Queen Maud Mts., Durham Point, northeast portal Thorne Glacier, *Q. A. Blackburn, R. S. Russell Jr., S. D. L. Paine QM-4 (83);* Scudder Mt., 86° 03′ S., 150° 40′ W., *Q. A. Blackburn, R. S. Russell Jr., S. D. L. Paine QM-6 (1), (2),* type, *(3), (4).*

LECIDEA **Painei** Dodge & Baker, sp. nov. Pl. 41, figs. 57–62.

Type: South Victoria Land, Queen Maud Mts., Scudder Mt. (B), Station 9, 86° 03′ S., 150° 40′ W., *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-2.*

Thallus ad 2 mm. diametro, irregularis, plus minusve areolatus, arachnoideus vel compactior, mollis gelifactusque madefactus, griseo-albidus; cortex ad 12 μ, fastigiatus, cellulis terminalibus hypharum medullae inflatis obscurisque, ad 4 μ diametro, non continuus, superficie strato irregulari cellularum emortuarum 25–30 μ crassitudine tectus; algae sub cortice coloniis parvis sparsis, cellulis ad 8 μ diametro; medulla hyphis 1–3 μ diametro, in funiculis compactis magnis laxe reticulatimque dispositis; cortex inferior deest aut paucis cellulis obscuris fastigiatis ut in cortice superiori.

Apothecia ad 0.27 mm., parva, irregulariter circularia, emarginata, convexa, sparsa vel gregaria, sessilia, nigra, carbonacea; cortex marginalis ad 35 μ, carbonaceus, pseudoparenchymaticus, cellulis pachydermaticis apice in epithecio mergens; hypothecium ad 20 μ, griseum vel fuscum, cellulis parvis, irregulariter pseudoparenchymaticis ad margines, subtenuescens; thecium ad 50 μ altitudine; paraphyses 0.75–1.0 μ diametro, recti neque inflati neque obscuri, non ramosi aut raro ramosi, tenuiter vaginati, epithecium 5–10 μ, irregulare, carbonaceum, KOH addito virescens; asci 23–31 × 6–9 μ, breves, obtuse clavati, apicibus vaginatis; ascosporae octonae, 6–6.5 × 3.5–5 μ, ovoideae vel breviter ellipsoideae, hyalinae, vaginatae.

Thallus up to 2 mm. in diameter, irregular, more or less areolate, arachnoid to more compact, soft and gelified when moist, dull grayish-white; upper cortex as much as 12 μ thick, of the enlarged and darkened terminal cells of the medulla, fastigiately arranged, not continuous as in *Lecidea cancriformis* and *L. Blackburni,* but of larger cells up to 4 μ in diameter, usually not more than a few cells thick, the whole covered by a more or less irregular layer of dead cells 25–30 μ thick at its best development; algae in scattered colonies below the cortex, cells up to 8 μ; medulla extensive, of slender hyphae 1–3 μ in diameter, closely packed in large, loose reticulate strands; lower cortex lacking or occasionally represented by scattered dark fastigiate cells as in the upper cortex.

Apothecia up to 0.27 mm., small, irregularly circular, emarginate, convex, numerous, scattered or closely grouped, sessile on the thallus, black, carbonaceous; marginal cortex up to 35 μ thick, carbonaceous, of thick-walled pseudoparenchyma, merging at the top with the epithecium, below thinning out and finally disappearing; hypothecium about 20 μ, grayish to fuscous, of small irregularly pseudoparenchymatous cells, tapering slightly; thecium up to 50 μ tall; paraphyses 0.75 to 1 μ in diameter, straight, tips neither expanded nor darkened, unbranched, rarely branched, with a narrow sheath, epithecium 5–10 μ thick, irregular, carbonaceous, turning green with KOH; asci 23–31 × 6–9 μ, 8-spored, short, bluntly clavate with a fairly prominent gelified sheath over the top; ascospores 6–6.5 × 3.5–5 μ, hyaline, short-ellipsoid or ovoid with a conspicuous hyaline sheath.

On granitic sandy loam.

SOUTH VICTORIA LAND: Queen Maud Mts., Scudder Mt. (B), Station 9, 86° 03′ S., 150° 40′ W., *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-2,* type.

CATILLARIA

CATILLARIA Massalongo, Richerche Auton. Lich. 78. 1852.

The type species is *C. chalybeia* (Borrer) Mass. (*C. lutosa* (Mont.) Mass.). Originally included in the genus, it was reduced to synonymy with *C. Philippaea* by Massalongo in 1856. *C concreta* Mass. belongs in *Rhizocarpon.*

Thallus crustose, endo- or epilithic, simple or with effigurate margins, attached to the substrate by the hyphae of the prothallus and the medulla, not corticate; algae *Protococcus* (cells in colonies suggesting *Gloeocapsa* in some species of sect. *Biatorina).* Apothecia circular, immersed to sessile, with hyaline, colored, or black parathecium, without amphithecium, epithecium concave or convex, light or dark-colored; hypothecium hyaline, colored or black; paraphyses not or sometimes branched, tips capitate, free or immersed in a gel; asci 8-spored; spores usually small (under 30 μ), hyaline, ovoid, ellipsoid, or elongate and bacilliform, straight or curved, finally 2-celled with thin wall and thin septum, without a sheath. Spermogonia ellipsoidal to flask-shaped, spermatia straight or slightly curved.

The genus is usually divided into two sections: *Biatorina,* with hyaline or colored parathecium and hypothecium; and *Eucatillaria,* with carbonaceous parathecium and hypothecium. These sections were originally described as genera by Massalongo and are frequently so considered. Of our five

Antarctic species here reported for the first time, two belong in *Biatorina,* and three in *Eucatillaria.*

KEY TO ANTARCTIC SPECIES

Hypothecium dark brown to black; asci under 50 μ; spores under 15 μ long.... ....EUCATILLARIA

  Paraphyses capitate with a smooth dark cap; thallus small, arachnoid to areolate, gelified...*C. cremea*

  Paraphyses with slightly expanded hyaline tips 2 μ long; thallus granulose, not gelified...*C. granulosa*

  Paraphyses not capitate, highly gelified; thallus large, floccose to calcareous when dry, gelified when moist...............................*C. floccosa*

Hypothecium hyaline or very light brown; asci over 54 μ; spores over 15 μ long; paraphyses capitate...BIATORINA

  Paraphyses with conspicuous gelified sheath; thallus scant, grayish over a conspicuous reticulate hypothallus; thecium 80–90 μ, epithecium dark ....*C. inconspicua*

  Paraphyses with slightly gelified sheath; thallus abundant, indeterminate, somewhat arachnoid, cream-colored; hypothallus not developed; thecium 50–60 μ tall, epithecium light............................*C. arachnoidea*

CATILLARIA **cremea** Dodge & Baker, sp. nov.

Pl. 42, figs. 68–71.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-8.*

Thallus ad 1 cm. diametro, arachnoideus vel areolatus et diffractus, gelifactus madefactus, albidus vel cremeus, saepe ab ochra saxorum tinctus, saxicola; cortex male evolutus, in marginibus rimisque areolarum paucis cellulis obscurioribus fastigiatis munitus, super algas amorphus; stratum gonidiale 65 μ crassitudine, cellulis ad 7 μ in coloniis sphericis, protococcoideis; medulla hyphis laxe reticulatis contexta; stratum basale 50–75 μ, cellulis compactioribus, brunneis obscurius, irregulariter dispositis, non fastigiatis.

Apothecia ad 0.35 mm. diametro, irregularia, applanata, sparsa, emarginata, raro subconcava, sessilia, nigra; parathecium ad 50 μ crassitudine, nigrum, carbonaceum, hypothecio mergens; hypothecium ad 75 μ crassitudine, obscure brunneum vel carbonaceum; thecium circa 50 μ crassitudine; paraphyses 0.75–1.0 μ, capitibus 1.5–2.5 μ, non ramosi, subflexuosi, graciles, epithecium circa 10 μ, obscurum; asci 31–37 × 12–15 μ, late clavati, vagina prominente; sporae octonae, 11–14 × 3–4 μ, uniseptatae, longae, ellipsoideae, apicibus frequenter truncatis.

Assimilative thallus thinly diffused over 1 cm., slightly arachnoid to areolate and fairly deeply cracked, gelified when moist, white to cream, often rusty and discolored from the substrate; cortex poorly developed, sometimes with a few darker fastigiate cells appearing in the cracks and on the sides of the areolae, amorphous over the tops of the areolae; algal layer 65 μ thick, cells protococcoid, up to 7 μ in diameter, in more or less spherical colonies; medulla simple, of loosely reticulate strands; basal cortex 50–75 μ, of more compact cells, darker brown, irregularly arranged, not fastigiate.

Apothecia up to 0.35 mm. in diameter, irregular in outline, flattened, scattered, emarginate, sometimes slightly concave, sessile on the areolae, black; parathecium up to 50 μ thick, black, carbonaceous, merging with the hypothecium which is up to 75 μ thick, light to dark brown and carbonaceous; thecium about 50 μ thick; paraphyses 0.75–1.0 μ, expanding to 1.5–2.5 μ at the heads, even, smooth on the outer surfaces of the heads with a dark cap, mostly unbranched, somewhat flexuous, slender, epithecium about 10 μ, dark; asci 31–37 × 12–15 μ, short, broadly clavate, especially when mature, sheath rather prominent, 8-spored; ascospores fasciculate (vertically aligned at maturity), 11–14 × 3–4 μ, uniseptate, long, slender-ellipsoidal, sometimes with truncate ends.

On dark greenish gray slate.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-8*, type.

CATILLARIA **floccosa** Dodge & Baker, sp. nov.

Pl. 42, figs. 63–67.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-2.*

Thallus bene evolutus, floccosus vel calcareus siccatus, gelifactus pustularisque madefactus, albidus vel viridescens; cortex male evolutus, catervis sparsis cellularum obscurarum fastigiatarum; stratum gonidiale circa 150 μ crassitudine, coloniis dispersis, cellulis 6–7 μ diametro; medulla ad 300 μ crassitudine, hyphis tenuissimis reticulatim dispositis, compactioribus ad algas; stratum basale 15 μ crassitudine, simile cortici. Cephalodia cum algis nostocaceis sub strato basali abundanter dispersa.

Apothecia ad 0.35 mm., frequenter circa 0.20 mm., sessilia, irregularia, convexa, in columnis thalli, sparsa, nigra, nitida; parathecium 10–12 μ crassitudine, nigrum; hypothecium ad 20 μ, cellulis nigris, plus minusve reticulatim dispositis; thecium 50–70 μ crassitudine; paraphyses 1.5–2 μ diametro, cellulis brevibus crassis brunneis gelifactis, apicibus vix inflatis, epithecium 4–5 μ, obscurum; asci 29–48 × 12–16 μ, elongati, apicibus vaginatis; sporae octonae, 11.5–15 × 3.5–6.5 μ, uniseptatae, non constrictae, alia cellula obtusa vel obtusior quam altera, acuta.

Assimilative portions of thallus well developed, on rock or among loose gravel and mosses, covering areas of several centimeters, floccose to calcareous when dry, gelified and pustular when moist, white to greenish from an abundance of included algae; cortex evanescent, represented by groups of dark fastigiate cells variable in size, scattered here and there over individual pustules; algal layer about 150 μ thick, of scattered colonies, cells 6–7 μ in diameter; medulla up to 300 μ thick, of very delicate hyphae in a loose net, mostly exposed at the surface, better developed and more compact about the colonies of algae; basal layer identical, with scattered dark cortical cells but continuous, about 15 μ thick. Cephalodia with *Nostoc* abundant on the under-side of the basal layer.

Apothecia up to 0.35 mm. in diameter, usually about 0.20 mm., sessile, capping the pillars of the assimilative portions, irregular, convex, scattered and irregular in distribution, black, shining; parathecium 10–12 μ thick, black; hypothecium up to 20 μ, not much diminished laterally, merging with the parathecium, of dark compact cells more or less reticulately arranged; thecium 50–70 μ thick; paraphyses 1.5–2 μ in diameter, of short thick brownish cells, not very distinct as they are highly gelified, tips scarcely inflated, epithecium 4–5 μ, dark; asci 29–48 × 12–16 μ, 8-spored, elongate, the apex pointed, covered with a fairly prominent sheath; spores 11.5–15 × 3.5–6.5 μ, uniseptate, not constricted, one cell usually blunt or blunter than the other which is either distinctly pointed or tapering.

On loose sandy loam from coarse-grained gray granite, granodiorite, and fine-grained dike.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-7.*

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-2*, type, *72W-14;* Lichen Peak, *P. Siple & S. Corey 73-3, 73-4, 73-7;* Chester Mts., *P. Siple & S. Corey 97A-1, 97A-2;* Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-4, R-6, R-2 (sterile);* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-1.*

CATILLARIA **granulosa** Dodge & Baker, sp. nov.

Pl. 43, figs. 78–83.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-10.*

Thallus ad 11 mm. diametro; areolae assimilantes 0.05–0.15 mm. diametro, granulosae, parvae, numerosae, albidae vel ravae, ecorticatae; algae protococcoideae, ad 8 μ diametro, rarissimae, in toto thallo sparsae; medulla hyphis obscure brunneis fuscisve, irregulariter sparsis, amorpha, coloniis bacteriorum interspersis.

Apothecia 0.1–0.33 mm. diametro, plerumque parva, singula vel caespitosa, fusca nigrave, subconcava, excipulo tenuissimo; amphithecium deest; parathecium 25–40 μ crassitudine, cellulis pachydermaticis fuscis isodiametricis, basaliter tenuescens; hypothecium 10–20 μ crassitudine, fuscum, plectenchymaticum; thecium 50–60 μ altitudine; paraphyses 1 μ diametro, apicibus ad 2 μ, hyalini, epithecium 10–20 μ, brunneum, gelifactum; asci 40–44 × (12–)15–18 μ, late clavati insuper, basaliter constricti; ascosporae 11–12 × 5–6 μ, ellipsoideae, una ex cellulis majore, ovoidea, hyalinae.

Thallus over areas up to 11 mm. in diameter; non-assimilative portion absent, assimilative areolae 0.05–0.15 mm., granular to pustular, small, numerous, whitish to drab; cortex lacking; algae protococcoid, up to 8 μ in diameter, very rare, and irregularly scattered throughout the thallus; medulla amorphous with dark brown hyphae irregularly distributed; frequently with large clumps of bacteria within the interstices.

Apothecia 0.1–0.33 mm. in diameter, mostly small, slightly concave with a faint exciple; amphithecium absent; parathecium 25–40 μ thick, well developed, of thick-walled isodiametric cells up to 3 μ forming a compact tissue, tapering below and disappearing in the region of the hypothecium; hypothecium 10–20 μ thick, dark, of closely woven hyphae somewhat fimbriate; thecium 50–60 μ tall; paraphyses 1 μ, slightly expanding above, reaching 2 μ at the tips, not darkened, epithecium 10–20 μ, brown, gelified; asci 40–44 × (12–) 15–18 μ, very broad-clavate above and constricted below, 8-spored; ascospores 11–12 × 5–6 μ, hyaline, ellipsoidal, becoming 2-celled, each cell uninucleate, one cell usually somewhat exceeding the other and more ovoid.

On weathered coarse-grained reddish brown granite.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-10*, type.

CATILLARIA **inconspicua** Dodge & Baker, sp. nov.

Pl. 43, figs. 84–87.

Type: Marie Byrd Land, Edsel Ford Range, Chester Mts., *P. Siple & S. Corey 97A-1.*

Thallus non assimilans niger, inconspicuus, reticulis parvis; cortex hyphis magnis obscuris, ramis per omnia irregulariter percurrentibus; medulla hyphis hyalinis tenuioribus reticulatim dispositis vel compactioribus; partes assimilantes griseae, paucae in areas 1 cm. diametro dispersae; cortex prominens, cellulis parvis fastigiatis paullo obscuris; stratum gonidiale 55–60 μ crassitudine, cellulis singulis, binis vel in coloniis parvis plus minusve verticaliter dispositis; medulla hyphis tenuibus ad corticem dendritice ramosis; stratum basale non bene evolutum, cellulis magnis obscuris fastigiatis.

Apothecia ad 1.35 mm. diametro, sessilia in areolis assimilantibus, pulvinata, convexa, irregularia, nigra, carbonacea, sparsa; cortex non evolutus; hypothecium 20–25 μ, hyalinum, hyphis parvis periclinalibus; thecium 80–90 μ altitudine; paraphyses circa 1 μ diametro, capitibus ad 4.5 μ, subobscuris, vaginatis, ramosi vel non ramosi, subflexui, epithecium ad 10 μ crassitudine, obscurum, addito KOH purpurascens; asci 56–67 × 14–16 μ, elongati, clavati, vaginati; sporae octonae, 15–19 × 4.5–7 μ, uniseptatae, elongatae, ellipsoideae, raro reniformes vel naviculares, non constrictae.

Non-assimilative portions of the thallus finely reticulate, black, very inconspicuous against the rock, of coarse dark hyphae forming the cortex and ramifying irregularly throughout the whole thallus; medulla of more slender hyaline hyphae forming fine reticulations, becoming more compact in places; assimilative portions scant over areas of 1 cm., grayish; cortex prominent, of small fastigiate cells little darkened; algal layer 55–60 μ thick, cells single, in pairs or small colonies more or less vertically arranged; medulla of slender loose cells branching in the subcortical region; basal layer not sharply differentiated, often confluent with the non-assimilative parts which form the base in such cases, of large dark fastigiate cells, occasionally occurring laterally in scattered areas.

Apothecia up to 1.35 mm., sessile on the assimilative areolae, pulvinate, convex, irregular in outline, black, carbonaceous, scattered; cortex not differentiated; parathecium of a few hypothecial cells merging with the cortex of the assimilative parts and the epithecium; hypothecium 20–25 μ thick, hyaline, scarcely diminishing in thickness from the center to the margin, of slender periclinal hyphae very compactly woven;

thecium 80–90 μ tall; paraphyses about 1 μ in diameter, heads 4.5 μ, slightly darkened, sheath rather conspicuous, branched or unbranched, slightly flexuous, epithecium about 10 μ thick, dark, turning purple on the addition of KOH; asci 56–67 × 14–16 μ, quite elongate, clavate with a sheath, 8-spored; spores 15–19 × 4.5–7 μ, uniseptate, elongate-ellipsoidal, rarely reniform or navicular, not constricted at the septum.

The systematic position of *C. inconspicua* is uncertain. The apothecium rests on an assimilative areola no larger than the apothecium. If the assimilative tissue is regarded as an amphithecium, this species belongs in *Lecania* near *L. Racovitzae* but clearly is not that species, while if it is regarded as thallus, it belongs in *Catillaria.*

On coarse-grained gray granite.

MARIE BYRD LAND: Edsel Ford Range, Chester Mts., *P. Siple & S. Corey 97A-1,* type; Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7 (1).*

CATILLARIA **arachnoidea** Dodge & Baker, sp. nov.

Pl. 42, figs. 72–77; pl. 65, fig. 428.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7(1).*

Thallus appressus, saxicola, conspicuus, indeterminatus, verrucosus, areolis ad 0.45 mm., irregularibus, angularibus, plus minusve arachnoideus, albidus vel cremeus; cortex evanescens, in marginibus areolarum, cellulis fastigiatis obscuris persistentibus; stratum gonidiale 85–90 μ crassitudine, cellulis coloniisque subverticaliter dispositis; medulla 220 μ crassitudine, hyphis 2–3 μ diametro, ramosis anastomosantibusque laxe implexis, compactior sub strato gonidiale apotheciisque, hyphis 1 μ diametro; stratum basale obscurum compactiusque.

Apothecia ad 0.33 mm. diametro, hemispherica vel irregularia, saepe angulata, plana vel convexa, emarginata, sparsa vel gregaria, sessilia, obscure brunnea vel nigra; cortex cellulis magnis nigris, 11–12 μ crassitudine; parathecium circa 20 μ crassitudine, cellulis obscure brunneis isodiametricis in cortice mergens; hypothecium ad 10 μ crassitudine, non prominens, hyalinum vel dilute brunneum, cellulis reticulatim dispositis; thecium 50–70 μ altitudine; paraphyses 1.5 μ diametro, capitibus 2.5 μ, non obscuris, gelifacti, ramosi vel non ramosi, epithecium 5–8 μ, non obscurum; asci 54–60 × 14–16 μ, elongato-clavati, vagina non prominente; ascosporae octonae, 15–18 × 4–6 μ, 1–2-septatae, non constrictae, elongatae, ellipsoideae, raro subreniformes vel naviculares.

Assimilative portion of thallus closely attached to rock, conspicuous and well developed, indeterminate, verrucose, areolae up to 0.45 mm. long, irregular, angular, more or less arachnoid, white to cream-colored; cortex not well developed, occurring in scattered places on lateral margins of the areolae, of dark fastigiate cells, evanescent over the rest, leaving tissue similar to the medulla above the algal layer which is 85–90 μ thick with cells and colonies somewhat vertically arranged; medulla 220 μ thick, of open reticulate tissue, hyphae branched and anastomosed, 2–3 μ in diameter, slightly more compact about the algae and below the apothecia, hyphae about 1 μ in diameter; basal layer sometimes darker, and a little more compact than the medulla but not sharply differentiated from it.

Apothecia up to 0.33 mm. in diameter, hemispherical to irregular, often angled by mutual pressure when close together, plane or convex, sometimes with a slight depression when young but never distinctly margined, scattered or gregarious, sessile, dark brownish to black; cortex 11–12 μ thick, of large black cells; parathecium 20 μ thick, of dark brown, isodiametric cells merging with the cortex and becoming progressively thin-walled toward the thecium; hypothecium up to 10 μ thick, not prominent, hyaline or light brown, of reticulately arranged cells, not thinning conspicuously toward the margin; thecium 50–70 μ thick; paraphyses 1.5 μ, expanding slightly at the apices up to 2.5 μ in diameter, heads not darkened, with a close gelified sheath, branched or unbranched, epithecium 5–8 μ, light; asci 54–60 × 14–16 μ, elongate-clavate, sheath not prominent, 8-spored; ascospores 15–18 × 4–6 μ, becoming 1–2-septate, not constricted at the septa, elongate-ellipsoidal, occasionally somewhat reniform or even navicular.

On coarse-grained gray granite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R(26–27)-7, R-7(1)*, type.

RHIZOCARPON

RHIZOCARPON Ram. ap. Lamarck & DeCandolle, Fl. Franç. ed. 3. **2**: 365. 1805.

Abacina Norm., Nyt. Mag. Naturvidensk. **7**: 236. 1853.

Siegertia Koerber, Parerga Lich. 180. 1861.

Phalodictyum Clements, Gen. Fung. 77. 1909.

The type species is *Rhizocarpon geographicum* (L.) Ram. The type of *Abacina* is not designated but *Abacina amphibia* (Fr.) Norm. may be so considered. The type of *Siegertia* is *Lecidea calcarea* (Weis) Hepp. The type of *Phalodictyum* is *P. obscuratum* (Ach.) Clem.

Thallus crustose, uniform, with well-developed hypothallus; ecorticate; algae *Protococcus.* Apothecia sessile or immersed in the thallus; parathecium carbonaceous, rarely brown; hypothecium dark; thecium gelified, paraphyses branched; asci 1–8-spored; ascospores hyaline or finally brown, 2- or several-celled, becoming muriform by vertical septa, with a well-developed gelified sheath. Spermatia cylindric to acicular, straight or nearly so.

Zahlbruckner recognizes two subgenera which are often recognized as genera:

Catocarpus Koerber, Syst. Lich. Germ. 223. 1855 (as section of *Buellia).*

Catocarpus Arnold, Flora **54**: 147. 1871.

Rehmiopsis Müll. Arg., Flora **55**: 537. 1872 (as section of *Patellaria).*

Catocarpon Th. Fries, Lichenog. Scand. 612. 1874.

Diphaeis Clements, Gen. Fung. 77. 1909.

Diphanis Clements, Gen. Fung. 77. 1909.

The type species of *Catocarpus* Koerb., *Catocarpus* Arn., *Catocarpon* Th. Fr., and *Diphaeis* Clem. is *C. badioatrus* (Flk.) Arn. The type of *Rehmiopsis* is *Patellaria heterodoxa* Müll. Arg. The type of *Diphanis* is *D. polycarpa* (Hepp) Clem.

This subgenus or genus is separated on the basis of its two-celled spores and shows some transition to *Buellia.* Two species have been reported from the Graham Land Archipelago.

Eurhizocarpon Stzbgr. includes species with muriform spores.

KEY TO ANTARCTIC SPECIES

Spores 2-celled . . . . CATOCARPUS
  Spores hyaline; thallus brownish or brownish gray, smooth, I blue . . *R. polycarpum*
  Spores brown; thallus brown, verrucose, I– . . . . *R. badioatrum* v. *Gerlachei*
Spores muriform . . . . EURHIZOCARPON

- Thallus pure white; medulla I–.................................*R. argyreum*
- Thallus yellowish.
  - Thecium more than 180 μ tall; paraphyses capitate, 4–6 μ.
    - Thecium 180–200μ; spores 25–43.7 × 16–18 μ; cortex 30–40 μ, with a hyaline zone 15 μ thick..............................*R. geographicum*
    - Thecium 240 μ; spores 26–30 × 14–18 μ; cortex 20–30 μ, with a hyaline zone 20 μ..*R. melanostictum*
  - Thecium 130 μ tall; paraphyses subcapitate, 2–3 μ; spores 27–34 × 12–15 μ; cortex 20–50 μ, with a hyaline zone 10 μ thick..........*R. nidificum*
  - Thecium 70–100 μ; paraphyses not capitate; spores 15–24.5 × 8–11 μ; cortex not differentiated...*R. flavum*
- Thallus ashy fuscous.
  - Ascospores 58–72 μ long, 2 per ascus..........................*R. geminatum*
  - Ascospores (20–)33–38 μ long, 8 per ascus; thallus 0.2–0.6 mm. thick..*R. griseolum*
  - Ascospores 28–30 μ long, 8 per ascus.
    - Thallus very thin, KC red..............................*R. parapetraeum*
    - Thallus thick, verrucose, KC–....................*R. grande* v. *atrocaesium*

RHIZOCARPON **flavum** Dodge & Baker, sp. nov.

Pl. 43, figs. 88–93; pl. 44, figs. 94–97; pl. 65, fig. 426.

Type: Marie Byrd Land, Mt. Stancliff, *P. Siple & S. Corey 72A-2.*

Thallus crustosus, appressus, 2.2 cm. diametro vel 3 × 1.5 cm., non assimilans niger, carbonaceus, continuus, margine determinata centro subfuniculoso; areolae elevatae, saepe cellulis emortuis albis tectae; cortex superior 15 μ crassitudine, fastigiatus, cellulis obscure brunneis vel nigris, isodiametricis; medulla 120 μ crassitudine, hyphis hyalinis verticalibus laxissime implicatis; areolae assimilantes ad 1.5 mm. longitudine, 0.45 mm. altitudine, irregulares, saepe sinuosae vel angulares, dein repetito diffractae, pulvinatae, flavae, sine marginibus cellularum corticalium, floccosae; cortex superior non differentiatus; stratum gonidiale ad 140 μ crassitudine, protococcoideum, cellulis 9–16 μ diametro; medulla ad 200 μ, hyphis verticalibus subbrunneis; stratum basale plus minusve pseudoparenchymaticum, brunneum, ad 150 μ crassitudine.

Apothecia ad 0.9 mm. diametro, convexa vel subconcava, marginata, angularia, sparsa vel gregaria, singulariter in columnis nata, nigra, non nitida, juniora cellulis emortuis corticalibus equatorialibus ornata; parathecium non bene evolutum; hypothecium obscurum, hyphis periclinalibus dense compactum, 60–90 μ, ad marginem tenuescens; thecium 70–100 μ altitudine; paraphyses 1.5–3 μ diametro, ramosi vel non ramosi, septati, aetate obscurascens, gelifacti, pachydermatici, apicibus non capitatis, raro obscure callosis, epithecium 8–10 μ crassitudine efficientes; asci 53–80 × 16×30 μ, clavati, vaginati, gelifacti, raro angustiores longioresque, tum sporis monostichis; sporae octonae, (15)–17–24.5 × 8–14 μ, nigerrimae, uniseptatae dein muriformes, raro nonseptatae.

Thallus closely attached to the rock over areas up to 2.2 cm. in diameter or 3 × 1.5 cm.; non-assimilative areas black, carbonaceous, usually continuous, margin determinate but often separating into distinct strands toward the center of the fructification; pillars frequently covered with dead white cortical cells giving an areolate or reticulate appearance, sometimes especially pronounced in a zone just back of the pure black margin; upper cortex 15 μ thick, fastigiate, forming a pseudoparenchyma of dark brown or black cells; medulla 120 μ thick, of vertical hyphae loosely woven; assimilative areolae up to 1.5 mm. long and 0.45 mm. high, irregular in outline, often sinuous or angular, further separated by secondary cracks, usually very pulvinate, chartreuse yellow, not bordered with black cortical cells or only very slightly so, floccose; upper cortex evanescent or not differentiated, but cells slightly more compact; algal layer up to 140 μ thick, protococcoid, cells 9–16 μ in diameter; medulla up to 200 μ thick, of vertical hyphae rather loosely arranged, brownish basal layer more or less pseudoparenchymatous from periclinal brown hyphae, up to 150 μ thick.

Apothecia up to 0.9 mm. in diameter, convex or slightly concave with a marginal rim, frequently angled, scattered or gregarious, borne singly on the pillars, sessile or subsessile, dull black, never shiny, when young with an equatorial fringe of dead cortical cells; parathecium scarcely distinguishable except as a few cells, more closely united, extending in a thin line from the hypothecium to the exciple; hypothecium dark, of closely united periclinal hyphae, 60–90 μ, thinning toward the margin; thecium 70–100 μ tall; paraphyses 1.5–3 μ in diameter, branched or unbranched, septate, apparently becoming darker with age, with conspicuous gelified sheaths, heavy walls, not or only slightly expanded at the tips, occasionally with a dark cap, forming an epithecium 8–10 μ thick; asci 53–80 × 16–30 μ, large, bluntly clavate, 8-spored, with a moderately conspicuous gelified sheath, sometimes narrow and elongate with spores practically monostichous; ascospores (15)–17–24.5 × 8–14 μ, very dark, at first uniseptate, later muriform, sometimes remaining undivided.

On weathered biotite-sericite, sericite-orthoclase schist, and fine-grained dike.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-3, DW-4, DW-5*; Lichen Peak, *P. Siple & S. Corey 73-10*; Mt. Stancliff, *P. Siple & S. Corey 72A-1, 72A-2*, type.

ACAROSPORACEAE

Thallus little developed, crustose, squamulose or dwarf foliose, homoeomerous or heteromerous, attached to the substrate by the hyphae of the medulla or the prothallus or by a central strand in *Glypholechia,* without rhizinae; ecorticate or more or less corticate; with *Protococcus* algae. Apothecia immersed in thalline warts, sometimes nearly perithecioid, sessile or short-stipitate, single or crowded, with a circular or somewhat irregular disc, biatorine, lecideine, or lecanorine; asci polysporous; ascospores very small, usually unicellular, two-celled in *Maronea,* with thin walls and without sheaths.

Only *Acarospora,* thallus small, squamulose with small-celled pseudoparenchymatous cortex, apothecia immersed without a well-developed parathecium, has previously been found in Antarctica.

KEY TO ANTARCTIC GENERA

Parathecium highly developed.
Apothecia biatorine with soft bright parathecium; epi- or endophloedal, saxicolous in Antarctica...*Biatorella*
Apothecia lecideine with carbonaceous parathecium.
Apothecia immersed; thallus well developed; epilithic, Arctic, alpine....
....*Sporostatia*
Apothecia sessile or short-stalked; thallus poorly developed.........*Sarcogyne*
Parathecium absent..*Acarospora*

BIATORELLA

BIATORELLA DeNotaris, Giorn. Bot. Ital. II. **1**^{1}: 192. 1846.

Myrioblastus Trevisan, Linnaea **28**: 289. 1856.

Strangospora Koerber, Parerga Lich. 173. 1860.

Biatoridium Lahm. ap. Koerber, Parerga Lich. 172. 1860.

The type species is *Biatorella Roussellii* (Durieu & Montagne) DeNotaris. The type of *Myrioblastus* is *Lecidea fossarum* Dufour. The type of *Biatoridium* is *B. monasteriense* Lahm. The type of *Strangospora* is *S. pinicola* Koerber.

Thallus epi- or hypophloedal, or epilithic, crustose, uniform or effigurate, attached to the substrate by hyphae of the prothallus or medulla; cortex absent or of irregularly woven hyphae; algae *Protococcus,* and arachnoid medulla. Apothecia circular, rarely irregular, immersed, sessile or very short-stalked, single; parathecium well developed above, absent below, disc smooth, verrucose or folded; hypothecium bright or dark; paraphyses slender, filiform, simple or seldom branched, persistent or evanescent; asci more or less clavate, polysporous; ascospores hyaline, unicellular, ellipsoidal or spherical, small, with a thin wall. Spermogonia immersed in the thallus or in thalline warts; spermatia ovoid or short-cylindric.

BIATORELLA **arachnoidea** Dodge & Baker, sp. nov.
Pl. 46, figs. 139–141.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-14.*

Thallus assimilans, 0.19–0.85 mm., arachnoideus, sparsus, ferrugineo-albus; algis ad 12 μ diametro, protococcoideis.

Apothecia 0.28–0.75 mm. diametro, parva, marginibus incurvis juventute, concava maturitate, pallido-flava; hypothecium hyalinum; thecium 35–40 μ altitudine; paraphyses 0.5–1.2 μ diametro, aequales, liberi, flexui, ramosi, frequenter sub apicibus bifurcati, non obscuri, cellulis longis, tenuibus, epithecium 10–15 μ, hyalinum; asci 34–40 × 20–21 μ, breves, late clavati, polyspori (30–50 per ascum), basi sine sporis; ascosporae 6–7.5 × 3–4 μ, ellipsoideae, apicibus obtusis vel subacutis, vaginatae.

All portions of the thallus assimilative, 0.19–0.85 mm., arachnoid, scattered, rusty white; algae up to 12 μ in diameter, protococcoid.

Apothecia 0.28–0.75 mm. in diameter, mostly small, with an inrolled margin when young, remaining more or less concave at maturity, pale yellowish; hypothecium hyaline; thecium 35–40 μ tall; paraphyses 0.5–1.2 μ in diameter, scarcely expanded at the tips, somewhat free and flexuous, branched, frequently bifurcate near the tip, not darkened on the outer surfaces, cells long, slender, epithecium 10–15 μ, hyaline; asci 34–40 × 20–21 μ, short and very broadly clavate with a small sheath, polysporous (30–50 per ascus), basal portion free from spores; ascospores 6–7.5 × 3–4 μ, ellipsoidal, ends blunt or somewhat pointed with a distinct halo.

On fine-grained dike in sedimentary rock.

Material of this species was very scant; only two apothecia were seen, of which one was mounted for study.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-14.*

SARCOGYNE

SARCOGYNE Flotow, Bot. Zeit. **9**: 753, 759. 1851.

Stereopeltis Franz. & DeNotaris, Comm. Soc. Crittogamol. Ital. $\mathbf{1}^1$: 26. 1861.

Pleolecis Clements, Gen. Fung. 76. 1909.

The type species is *S. corrugata* Flotow. The type species of *Stereopeltis* is *S. macrocarpa* Franz. & DeNotaris. The type species of *Pleolecis* is *Lecidea geophana* Nyl.

Thallus poorly developed, epilithic, crustose; often ecorticate or with a poorly developed fastigiate cortex; algae *Protococcus;* medulla loosely woven without lower cortex. Apothecia sessile or short-stipitate, often somewhat elongate or angled, lecideine with a carbonaceous parathecium; hypothecium hyaline or brown; paraphyses slender, sometimes branched, gelified; asci polysporous; ascospores simple, ellipsoidal to spherical, small, thin-walled.

This genus is often considered a subgenus of *Biatorella,* from which it differs in its poorly developed, epilithic thallus and its lecideine, more or less angled, substipitate apothecia with highly developed parathecium. The thallus is often reduced to a small areole at the base of the apothecium.

No species have previously been reported from the Antarctic.

SARCOGYNE **angulosa** Dodge & Baker, sp. nov.

Pl. 46, figs. 127–132.

Type: Marie Byrd Land, Edsel Ford Range, Chester Mts., *P. Siple & S. Corey 97A-3.*

Thallus assimilans ad 0.09 mm. diametro, arachnoideus, delicatus, cremeus; cortex rarus, cellulis fastigiatis obscure brunneis fuscisve, superficie zona crystallorum ($CaCO_3$) 10–15 μ crassitudine; stratum gonidiale sparsum, cellulis protococcoideis ad 8 μ diametro; medulla ad 180 μ crassitudine, hyphis magnis irregularibus leptodermaticis, ad 4 μ diametro, laxe subverticaliter dispositis; cortex inferus non evolutus.

Apothecia 0.08–0.4 mm. diametro, irregularia, ellipsoidea vel plus minusve rectangularia, marginata, sparsa caespitosave angulataque, nigra, nitida exsiccatione, margine nigra, disco rubro-brunneo madida; parathecium 10–30 μ crassitudine, basaliter tenuescens, paucis cellulis obscure fuscis isodiametricis, 2–3 × 10–13 μ, pachydermaticis; hypothecium ad 20 μ crassitudine, hyalinum, cellulis compactioribus; thecium 60–80 μ altitudine; paraphyses 0.5–1.0 μ diametro, apicibus ad 4 μ diametro, flexuosi, ramosi, obscuri, epithecium 10–15 μ, gelifactum carbonaceumve; asci 64–81 × 15–24 μ, polyspori, late clavati insuper, subtus tenuescentes, sporis tote impleti; ascosporae 2.2–3.5 ×1.1–2.0 μ, ovoideae, halone inconspicuo.

Non-assimilative portion absent; assimilative portions up to 0.09 mm. in diameter, arachnoid, scantily spread over the rock, very delicate and limited to the basal portions of the apothecia, cream-white; cortex scantily represented by occasional groups of dark brown to fuscous fastigiate cells, the outer surface covered more frequently by a zone of crystalline deposits ($CaCO_3$) 10–15 μ thick; algae protococcoid, up to 8 μ in diameter, relatively few in small scattered groups; medulla up to 180 μ thick, of large irregular thin-walled hyphae up to 4 μ in diameter, loosely and more or less vertically arranged; basal cortex not differentiated.

Apothecia 0.08–0.4 mm. in diameter, irregularly circular or elliptic to more or less rectangular with distinct margin, scattered or closely clustered and then angled by mutual pressure, black, shining when dry, the margin black, the disc dull reddish brown when moistened; parathecium 10–30 μ thick, well developed laterally, thinning below to a few dark fuscous isodiametric cells, 2–3 × 10–13 μ, the outermost rows darkened and thick-walled; hypothecium about 20 μ thick, of more compact cells, hyaline, merging laterally into the parathecium; thecium 60–80 μ tall; paraphyses 0.5–1.0 μ in diameter, expanding at the tips to heads up to 4 μ, flexuous, branched, darkened on the outer surfaces, epithecium 10–15 μ, dark, gelified to carbonaceous; asci 64–81 × 15–24 μ, polysporous, broadly clavate above, slender below, entirely filled with spores from tip to base; ascospores 2.2–3.5 × 1.1–2.0 μ, ovoid, with a faint scarcely distinguishable halo.

On highly metamorphosed quartzitic rock.

MARIE BYRD LAND: Edsel Ford Range, Chester Mts., *P. Siple & S. Corey 97A-3*, type.

SARCOGYNE grisea Dodge & Baker, sp. nov.

Pl. 46, figs. 133–138.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1.*

Pars non assimilans funiculis irregularibus nigris; pars assimilans floccis sparsis vel areis compactioribus 2 × 3 mm., albida vel grisea, ecorticata; algae ad 10 μ, protococcoideae, rarae, sparsae; medulla laxe filamentosa; cortex inferior deest.

Apothecia ad 0.45 mm. diametro, irregulariter circularia, concava, marginata, nigra, nitida vel non, sessilia, sparsa, singula aut gregaria coacervataque; parathecium 30– 80 μ crassitudine, pseudoparenchymaticum, fuscum vel dilute brunneum, irregulariter sub thecium 100–200 μ percurrens; thecium circa 100 μ altitudine; paraphyses 1–1.5 μ diametro, graciles, flexuosi, simplices vel ramosi, non capitati, evaginati, non obscuri, epithecium 10–20 μ, hyalinum; asci 58–66 × 21–26 μ, late clavati, sporis impleti, polyspori, vagina 18 μ apice crassitudine; ascosporae 2–2.5 × 0.5–1.5 μ, hyalinae, ovoideae ellipsoideaeve.

Non-assimilative portion confined to a few short irregular black strands below the assimilative portions which range from fragmentary bits to more compact areas 2 × 3 mm., white to grayish, not corticate; algae up to 10 μ, protococcoid, rare, scattered; medulla of loose filamentous hyphae; lower cortex not differentiated.

Apothecia up to 0.45 mm. in diameter, irregularly circular, very concave, marginate, black, shining or dull, sessile, scattered and single or gregarious and heaped; parathecium 30–80 μ thick, pseudoparenchymatous, fuscous to light brown, irregularly extending below the thecium 100–200 μ; thecium about 100 μ tall; paraphyses 1–1.5 μ in diameter, slender, flexuous, branched or not, without a prominent sheath, not much expanded at the tips nor darkened, epithecium 10–20 μ, hyaline; asci 58–66 × 21–26 μ, broadly clavate and completely filled with spores, polysporous, with a conspicuous sheath up to 18 μ thick at the apex; ascospores 2–2.5 × 0.5–1.5 μ, hyaline, ovoid to ellipsoidal.

On erratic pink granite and sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1;* Mt. Stancliff, *P. Siple & S. Corey 72A-1.*

UMBILICARIACEAE

Thallus foliose, mono- or polyphyllous, attached to the substrate by a central strand, heteromerous, under-side often rhizinose, corticate on both surfaces; medulla loose, algae *Protococcus*. Apothecia appressed, sessile or almost stalked; amphithecium rarely present; parathecium carbonaceous, usually well developed, with a loose medulla below, sometimes with a few algae, disc folded, seldom smooth; asci 1–8-spored; spores hyaline or dark, unicellular, several-celled to muriform with a thin wall.

The division of this family into genera and smaller subdivisions presents serious problems. Zahlbruckner recognizes five genera as in the following key. Frey would unite *Gyrophora* and *Umbilicaria.* Scholander would recognize *Umbilicaria* and *Gyrophora* with different characters than those used by Zahlbruckner, and would segregate two others. Since most of our Antarctic material is sterile, we have referred it to *Umbilicaria,* the oldest name in the group, without attempting to reach a decision on the three current classifications of this family. *Charcotia* Hue is endemic in the Antarctic.

The systematic position of *Omphalodium* has long been debated. It is usually placed in the Parmeliaceae on the basis of a lecanorine apothecium. The presence of a lecanorine apothecium in *Charcotia* and *Dermatiscum* of the Umbilicariaceae seems to warrant the inclusion of *Omphalodium* in this family. When sterile, it would be looked for here.

KEY TO ANTARCTIC GENERA (after Zahlbruckner)

Apothecia lecideine.
  Spores unicellular, often brown in age; asci 8-spored.............. *Gyrophora*
  Spores muriform, brown; asci 1–2-spored.......................... *Umbilicaria*
Apothecia lecanorine; asci 8-spored.
  Spores unicellular.. *Omphalodium*
  Spores 2-locular.
    Spores hyaline.. *Charcotia*
    Spores brown.. *Dermatiscum*

UMBILICARIA

UMBILICARIA Hoffm., Desc. Adumb. Pl. . . . Lich. **1**: 9. 1789.

Two type species were recognized in Hoffmann's first treatment: *U. exasperata* treated by Zahlbruckner as a variety of *Gyrophora proboscidea,* and *U. cirrosa,* both in *Gyrophora* sect. *Eugyrophora.*

Thallus foliose, mono- or polyphyllous, attached to the substrate by a central strand, heteromerous, under-side smooth or hirsute; upper cortex pseudoparenchymatous, commonly covered by a much thinner, amorphous layer; algae protococcoid; medulla arachnoid, lower cortex pseudoparenchymatous, sometimes from a palisade of hyphae with isodiametric cells. Apothecia lecideine, disc smooth or papillate or gyroseplicate; asci 1-, 2-, or 8-spored, ascospores 1-, 2-celled or muriform, hyaline or brown. Spermogonia papillate, immersed, with black tips, spermatiophores branched; spermatia short to cylindric.

KEY TO SPECIES REPORTED FROM THE ANTARCTIC

Without rhizinae below.
  White or pale below, dark above with pale margins; apothecia lecanorine; ascospores unicellular............................*Omphalodium quartum*
  Dark below.
    Areolate-verrucose below; monophyllous............................*U. rigida*
    Glabrous or rarely white-granular below.
      Polyphyllous; upper cortex 20–40 μ thick, black to ashy with white globules; fuscous below..................................*U. parvula*
      Monophyllous.
        Upper cortex rimulose-areolate, ashy pruinose; below black with pale margins....................................*U. leiocarpa* v. *nana*
        Upper cortex reticulate-rugose.
          Upper cortex 150 μ, with fine rimose areolae, dark gray or brown; below black with paler margins....................*U. decussata*
          Upper cortex 80 μ, black with white hemispheric or flattened warts; below fuscous.......................................*U. eximia*
          Upper cortex 10–15 μ, deep olive buff shading to dark olive gray at the margins; below black.............................*U. rugosa*
        Upper cortex cerebriform-rugose, 20 μ, minutely rimose-areolate, between Naples yellow and olive buff, darkening; below light ochraceous buff, darkening............................*U. cerebriformis*
        Upper cortex smooth, minutely areolate, 20 μ, chamois to olive buff, darkening; below blackening.....................*U. pateriformis*
With rhizinae below; monophyllous.
  Pale below; ashy pruinose above with black marginal rhizinae.....*U. cylindrica*
  Fuscous below; ashy pruinose above with tufts of marginal rhizinae..*U. cristata*

Black below.

Upper cortex gray to chocolate brown, rimose-areolate, 30–40 μ thick; apothecia lecideine; spores unicellular, 8–12.5 × 5.3–8 μ........*U. vellea*

Upper cortex bay becoming bay fuscous near the margins, slightly rimulose-areolate..................................*U. Dillenii* v. *solida*

Upper cortex ashy rufidulous, 40–100 μ thick, smooth, very slightly rugulose under lens; apothecia lecanorine; spores 2-celled, 12–14 × 4–5 μ ....*Charcotia rufidula*

Upper cortex mummy brown to light buff, 20–25 μ thick, deeply reticulate-rugose, slightly rimulose-areolate in center, otherwise not cracked; rhizinae not concrescent in trabeculae......................*U. spongiosa*

OMPHALODIUM **quartum** (Darbishire) Dodge & Baker, comb. nov.

Parmelia quarta Darbishire, Nat. Antarct. [Discovery] Exp. Nat. Hist. Lichenes **5**: 6. 1910.

UMBILICARIA **rugosa** Dodge & Baker, sp. nov.

Pl. 44, figs. 98–104; pl. 63, figs. 414, 416.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-12.*

Thallus monophyllus, 8–9 cm. diametro, reticulatim scrobiculosus, centro olivaceo-alutaceus, marginibus obscure olivaceo-griseis, crenulatis, tenuissimis, fragilibus, non laciniatus, subtus niger, minute floccosus vel pruinosus, laevis, sine rhizinis, ad umbilicum non rugosus; cortex superior 10–15 μ crassitudine, cellulis magnis isodiametricis, exteris obscuris, interis hyalinis, strato ad 25 μ crassitudine cellularum emortuarum tectus; stratum gonidiale 20–65 μ crassitudine, cellulis ad 10 μ diametro, protococcoideis; medulla 200–300 μ crassitudine, hyphis 2–4 μ diametro, pachydermaticis, laxe implexis, ramosis anastomosantibusque, cellulis brevibus; cortex inferior ad 40 μ crassitudine, pseudoparenchymaticus, obscurus, sine cellulis emortuis.

Apothecia ad 2 mm. diametro, irregularia, gyrosa, fusca nigrave, non nitida; parathecium ad 25 μ crassitudine, fuscum, cellulis pachydermaticis isodiametricis; medulla hyphis laxe implexis; hypothecium ad 150 μ crassitudine, obscurum, irregulare; thecium 50–80 μ altitudine; paraphyses 1 μ diametro, vaginati, simplices ramosive, septati, capitibus 1.5–2 μ diametro, epithecium 10–13 μ crassitudine, gelifactum, brunneum; asci (37–)39–46 × 11–13.5 μ, late clavati insuper, gracillimi subtus, vagina tenui; ascosporae octonae, 7.5–9 × 3–4 μ, ellipsoideae, apicibus obtusis, hyalinae.

Thallus monophyllous, 8–9 cm. in diameter, upper surface deeply and coarsely reticulate-scrobiculate, folds closer and pits shallower near the margin, center deep olive buff, margins dark olive gray, crenulate, very thin and fragile, not laciniate, below black, dull, appearing minutely cottony or pruinose, smooth, without rhizinae, not folded at the umbilicus; upper cortex 10–15 μ thick, of large isodiametric cells, very dark on the outside, hyaline within, covered by a layer of dead cells up to 25 μ thick; algal layer 20–65 μ thick, cells up to 10 μ, protococcoid; medulla 200–300 μ thick, of thick-walled hyphae 2–4 μ in diameter with rather short cells loosely interwoven, branched, and anastomosed; lower cortex up to 40 μ thick, pseudoparenchymatous, dark, without a layer of dead cells at the surface.

Apothecia up to 2 mm. in diameter, irregular, gyrose, fuscous to black, dull; parathecium up to 25 μ thick, fuscous, cells isodiametric, thick-walled, continuous laterally with the thalline cortex; medulla of loosely woven hyphae; hypothecium up to 150 μ thick, dark, irregular; thecium 50–80 μ tall; paraphyses 1 μ, expanding to heads 1.5–2 μ in diameter, with a sheath, straight or branched, septate, epithecium 10–13 μ, gelified, brown; asci (37–)39–46 × 11–13.5 μ, clavate above and very slender below, with a thin sheath, 8-spored; ascospores 7.5–9 × 3–4 μ, ellipsoidal, mostly with blunt ends, hyaline.

On orthoclase-sericite-siderite schist, coarse pink granite, fine-grained dike, and weathered dike of porphyritic diabase.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-12*, type, *HW-13, HW-14, HW-15.*

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-13, 72W-14, 72W-15, 72W-16;* Mt. Grace McKinley, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff McK-2, McK-3, McK-6, McK-10.*

UMBILICARIA **cerebriformis** Dodge & Baker, sp. nov.
Pl. 45, figs. 107–110; pl. 63, fig. 412.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-15.*

Thallus monophyllus, ad 2.5 cm. diametro, rugosus cerebriformisque, minute areolatus, marginibus crispatis, elevatis, subpruinosis, flavus neapolitanus aut olivaceo-alutaceus, nigricans, subtus laevis, dilute ochraceo-alutaceus, nigricans, sine rhizinis; cortex superior ad 20 μ crassitudine, subfastigiatus, decompositus pseudoparenchymaticusve, non obscurascens, cellulis 3–4 μ diametro, laxe dispositis, strato gelifacto ad 60 μ crassitudine, fracto tectus; stratum gonidiale 40–50 μ crassitudine, 25–60 μ sub cortice, cellulis protococcoideis, ad 9 μ diametro, in coloniis parvis; medulla frequenter 140–175 μ crassitudine aut ad 400 μ, hyphis 2–4 μ diametro, ramosis anastomosantibusque, verticaliter super algas dispositis, et densius periclinalibus in strato 30–40 μ crassitudine ad corticem inferiorem; cortex inferior 30–40 μ crassitudine, pseudoparenchymaticus, obscurus.

Apothecia juvenilia, nigra, sessilia subimmersave; cortex 35 μ, fastigiatus intus cortici thallino similis, hyphis cellulis isodiametricis nigris, 15 μ diametro terminatis; parathecium tenue, hyalinum, hyphis tenuibus dense compactis; hypothecium circa 60 μ crassitudine; thecium circa 60 μ altitudine; paraphyses tenues, 1 μ diametro; asci juveniles clavati, vaginati.

Spermogonia ampulliformia juventute, dein applanata irregulariaque, ostiola parva; murus carbonaceus, niger, cellulis parvis isodiametricis; spermatiophorae flexuosae, tenues, septatae; spermatia bacilliformia, recta, brevia.

Thallus monophyllous, up to 2.5 cm. in diameter, surface rugose to cerebriform, minutely areolate, elevated and coarsely crenulate, subpruinose, between Naples yellow and olive buff, darkening; lower surface smooth, light ochraceous buff, blackening, without rhizinae; upper cortex about 20 μ thick, subfastigiate, decomposed to pseudoparenchymatous but not darkened except occasionally when the outer cell-walls are slightly so, cells 3–4 μ in diameter, loosely arranged, covered by a gelified layer up to 60 μ thick, cracked into areoles of very unequal size; algal layer 40–50 μ thick, 25–60 μ below the upper cortex, cells up to 9 μ in diameter, protococcoid, more or less grouped in small colonies; medulla commonly 140–175 μ thick but expanding to 400 μ, of hyphae 2–4 μ in diameter, branched and anastomosed, vertical and branched above the algal layer, irregularly interwoven in the central portion, fibrous and dense for 30–40 μ next the lower cortex which is 30–40 μ thick, dense, pseudoparenchymatous, mostly very dark, sometimes without color.

Apothecia very young, black, sessile to somewhat immersed; cortex 35 μ, fastigiate, inner portion similar to that of the thallus, hyphae ending in thick-walled black cells about 15 μ thick which extend over the disc at this stage; parathecium thin, hyaline, of slender, densely woven hyphae; hypothecium about 60 μ thick, very deeply staining; thecium about 60 μ tall; paraphyses slender, about 1 μ in diameter; young asci clavate with a gelified sheath, filled with deeply staining protoplasm.

Spermogonia flask-shaped when young, becoming flattened and irregular with a small ostiole; wall carbonaceous, black, of small-celled pseudoparenchyma; spermatiophores flexuous, slender, closely septate; spermatia bacilliform, straight, short. The old spermogonia are frequently invaded by hyphae of *Hormiscium.*

On quartzite and granite, leuco-sodaclase granodiorite, porphyritic diabase, and crypto-crystalline pink granite.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-10, HW-11, HW-12a, HW-13.*

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-15,* type; Mt. Grace McKinley, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff McK-6, McK-8.*

UMBILICARIA **pateriformis** Dodge & Baker, sp. nov.

Pl. 44, figs. 105–106.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Mt., *P. Siple & S. Corey 72W-13.*

Thallus monophyllus, ad 1 cm. diametro, laevis, minute areolatus, marginibus laevibus aut sublaceratis, fragilibus, olivaceo-alutaceus, nigricans, subtus niger, laevis, sine rhizinis; cortex superior circa 20 μ crassitudine, cellulis 4–5 μ, isodiametricis, strato ad 20 μ crassitudine gelifacto diffracto tectus; stratum gonidiale 15–25 μ crassitudine, 20–40 μ sub cortice superiori, cellulis ad 9 μ diametro, protococcoideis; medulla 90–125 μ crassitudine, hyphis tenuibus circa 0.75 μ diametro, ramosis anastomosantibusque, super algas verticaliter, sub algis irregulariter contextis et ad corticem inferiorem periclinaliter dispositis; cortex inferior circa 20 μ crassitudine, cellulis 4–7 μ diametro, isodiametricis, pachydermaticis, nigris. Sterilis.

Thallus monophyllous, up to 1 cm. in diameter, surface smooth, minutely areolate, margin smooth, occasionally somewhat lacerate, rather fragile, between chamois and deep olive buff, blackening, below smooth, black, without rhizinae; upper cortex about 20 μ thick, pseudoparenchymatous to fastigiate, cells 4–5 μ in diameter, covered with a broken gelified layer up to 20 μ thick; algal layer 15–25 μ thick, 20–40 μ below the upper cortex, cells up to 9 μ in diameter, protococcoid; medulla 90–125 μ, of slender hyphae about 0.75 μ in diameter, branched and anastomosed, regular and vertical above the algal layer, irregularly woven below and becoming periclinal next the lower cortex which is about 20 μ thick, cells 4–7 μ, isodiametric, thick-walled, dark, much denser than the upper cortex. Apothecia not seen.

We have hesitated to describe this as a distinct species, since it is sterile and small. It may be only a juvenile stage of *U. cerebriformis,* yet many small thalli of the latter show the beginning of the wrinkling and folding of the upper surface before they have reached the diameter of this. Microscopically they are somewhat similar. Some of the material cited from King Edward VII Land is lighter and some darker than the type.

On granite and fine-grained dike.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-13.*

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-13,* type.

UMBILICARIA **cristata** Dodge & Baker, sp. nov.
Pl. 45, figs. 122–126.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-1a.*

Thallus monophyllus, 2–3 cm. diametro, laevis aut centro verrucosus rugosusque, marginibus sublaceratis, rhizinosis, fragilis siccatus, cinereo-pruinosus, centro minute rimuloso-areolato, subtus fuscus marginibus dilutioribus; rhizinae cylindricae, ramosae, apicibus ramisque cinereis; cortex 5–10 μ crassitudine, pseudoparenchymaticus, cellulis 3–5 μ diametro, exteris obscuris, strato 3–6 μ crassitudine cellularum emortuarum tectus; algae ad 10 μ diametro, protococcoideae, sub cortice superiore sparsae; medulla 140–150 μ crassitudine, hyphis 2–3 μ diametro, ramosis anastomosantibusque, insuper reticulatim, subtus periclinaliter dispositis; cortex inferior 30–40 μ crassitudine, pseudoparenchymaticus, cellulis exteris obscuris; rhizinae hyphis periclinalibus cum cortice pseudoparenchymatico; stipes irregularis, 1.5–2.5 mm. diametro, cavitate centrali 1 mm. diametro; cortex obscurus, medulla hyalina, cellulis compactis verticalibus, sine algis.

Thallus monophyllous, 2–3 cm. in diameter, surface smooth or verrucose and rugose near the center, margin somewhat lacerate with dense tufts of rhizinae, very brittle when dry, ashy pruinose, minutely rimulose-areolate, especially toward the center, below fuscous, margins lighter with occasional cylindrical branched rhizinae, tips and branches ashy; upper cortex 5–10 μ thick, of loose pseudoparenchyma, the cells 3–5 μ in diameter, outer ones dark, the whole covered by an irregular layer of dead cells 3–6 μ thick; algae up to 10 μ in diameter, protococcoid, scattered near the cortex; medulla 140–150 μ thick, of branched and anastomosing hyphae 2–3 μ in diameter, loosely reticulate above, more or less periclinal near the lower cortex which is 30–40 μ thick, dark on the outside, hyaline within, pseudoparenchymatous; rhizinae dark with a pseudoparenchymatous cortex continuous with that of the thallus and with periclinal hyphae within; stipe very irregular in cross-section, 1.5–2.5 mm. in diameter with a central opening 1 mm. in diameter; cortex dark, medulla hyaline, of compact vertical cells. In longitudinal section the compact basal portion pseudoparenchymatous, the fibrous vertical tissue 14–20 μ thick, the cells 1–3 μ in diameter, and a dark cortex on the outside with no cortex on the inside. Sterile.

On coarse-grained granite.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-1a*, type.

UMBILICARIA **spongiosa** Dodge & Baker, sp. nov.

Pl. 45, figs. 111–121.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-9.*

Thallus monophyllus, ad 15 cm. diametro, fragilis, profunde reticulatimque rugosus, centro verrucosus ad margines laevior impressusque, marginibus laevibus, crispatis, non laceratis, coriaceus, obscure brunneus vel ravus, pruinosus, centro subareolato, subtus sepiaceus, laevis, dense rhizinosus; rhizinae sepiaceae ad thallum, dilutiores ad apices, subramosae, cylindricae, non in trabeculis anastomosantes; cortex superior 20–25 μ crassitudine, cellulis pachydermaticis, 2–3 μ diametro, pseudoparenchymaticus, strato 2–4 μ crassitudine cellularum emortuarum tectus; stratum gonidiale ad 75 μ crassitudine, cellulis protococcoideis, ad 12 μ diametro; medulla 250–400 μ crassitudine, hyphis 2.5–3 μ diametro, irregulariter dispositis; cortex inferior 10–20 μ crassitudine, cellulis exteris pachydermaticis, obscuris, isodiametricis; rhizinae hyphis ramosis, tenuibus, raro anastomosantibus, cortice pseudoparenchymatico, circa 10 μ crassitudine tectae; stipes 1.5–2 mm., cavitatibus centralibus aut lateralibus, cortex fuscus irregularis, pseudoparenchymaticus; medulla hyphis densissimis contexta, sine algis.

Spermogonia 400 μ altitudine, 325 μ diametro ad basim, ad ostiolam tenuescens, ostiola circa 150 μ diametro; murus cellulis obscuris compactis, 5–7 μ diametro; spermatiophorae ramosae, 1 μ diametro, apicibus attenuatis; spermatia 1 × 0.5 μ, recta.

Thallus monophyllous, up to 15 cm. in diameter (greatly broken in transit, fragments 5–6 cm.), surface deeply reticulate-rugose and verrucose in center, smoother and only impressed at margin which is smooth, not torn, and very much crisped, leathery when dry, mummy brown to light buff, pruinose, very slightly areolate in center, otherwise not cracked, below sepia, smooth, very densely rhizinose; rhizinae sepia next the thallus, becoming pale pinkish buff toward the tips, sparingly branched, cylindric, not anastomosing into trabeculae; upper cortex 20–25 μ thick, surface very uneven, cells thick-walled, 2–3 μ in diameter, isodiametric, not darkened, the whole covered by a layer of dead cells 2–4 μ thick or lacking entirely; algal layer up to 75 μ thick, cells up to 12 μ in diameter, protococcoid; medulla 250–400 μ thick, of hyphae 2.5–3 μ in diameter, irregularly arranged, often somewhat periclinal next the lower cortex which is 10–20 μ thick, the outer cells isodiametric, thick-walled, dark; rhizinae of slender branched, rarely anastomosed hyphae, covered with a pseudoparenchymatous cortex about 10 μ thick; stipe central, 1.5–2 mm. in diameter, in section irregular in outline with small openings either central or lateral, of compact hyphal tissue covered both externally and internally by a dark irregular pseudoparenchymatous cortex, without algae.

Spermogonia 400 μ tall, 325 μ in diameter at the base, tapering to a narrower neck, about 150 μ in diameter; the wall of compact dark cells 5–7 μ in diameter; spermatiophores branched, about 1 μ in diameter, tapering at the ends; spermatia 1 × 0.5 μ, straight.

On sericite-orthoclase schist or on sandy loam.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73–9*, type; Skua Gull Peak, *P. Siple & S. Corey 72W-1, 72W-15.*

LECANORACEAE

Thallus crustose, uniform or with effigurate margins, rarely dwarf-fruticose, branched, attached to the substrate by the hyphae of the prothallus or of the medulla, without rhizinae, heteromerous except in *Harpidium*; ecorticate or corticate; with *Protococcus.* Apothecia immersed in the thallus or sessile, round; amphithecium well developed; parathecium poorly developed or lacking; hypothecium hyaline, usually with algae below; paraphyses unbranched and free or branched and intricate; asci 8–32-spored; spores hyaline, rarely brownish, unicellular, 2 or more celled or muriform and many-celled, thin-walled.

KEY TO ANTARCTIC GENERA

- Spores unicellular; paraphyses unbranched and free.
  - Thallus gray or white........*Lecanora*
    - Thallus not effigurate; no parathecium.
      - Apothecia immersed, concave........*Aspicilia*
      - Apothecia sessile........*Eulecanora*
    - Thallus effigurate; parathecium often highly developed but algal layer under the hypothecium.
      - Cephalodia absent.
        - Apothecia sessile; alpine, Arctic and Antarctic........*Squamaria*
        - Apothecia immersed; Kerguelen Island........*Urceolina*
      - Cephalodia present.
        - Apothecia sessile; Arctic, alpine........*Placopsis*
        - Apothecia immersed, disc concave........*Aspiciliopsis*
    - Thallus dwarf-fruticulose; California........*Cladodium*
  - Thallus bright yellow........*Candelariella*
- Spores uniseptate (rarely pluriseptate); paraphyses unbranched and free.
  - Thallus gray or brown........*Lecania*
    - Thallus crustose........*Eulecania*
    - Thallus squamulose........*Solenospora*
    - Thallus fruticulose........*Thamnolecania*
  - Thallus bright yellow........*Candelariella*

LECANORA

LECANORA Acharius, Lichenogr. Univ. 77. 1810.

The type species is not designated.

Thallus crustose, uniform or effigurate or squamose and small-foliose, seldom dwarf-fruticose, attached to the substrate by the hyphae of the hypothallus or of the medulla, without rhizinae, heteromerous; ecorticate or corticate; algae *Protococcus*. Apothecia immersed or sessile, circular; amphithecium well developed; parathecium usually absent or poorly developed, rarely well developed; paraphyses unbranched, free; hypothecium hyaline or colored; asci normally 8-spored, rarely 16–32-spored; ascospores hyaline, ellipsoidal, elongate to spherical, rarely kidney-shaped, thin-walled without a sheath. Spermatia bacilliform, cylindric or filiform, straight or curved.

The characters of the sections which are often recognized as genera are given above in the Key to the Genera.

KEY TO ANTARCTIC SPECIES OF OCHROLECHIA AND LECANORA

Spores large, often less than 8 per ascus; paraphyses conspicuously and intricately branched, forming an epithecium 40 μ or more thick.....*Ochrolechia*
  Spores 44–76 × 30–40 μ; asci 256 × 70 μ, 4-spored..............*O. Deceptionis*
  Spores 22–40 × 18–26 μ; asci 180 × 50 μ, 6-8-spored................*O. frigida*
Spores much smaller, 8 per ascus; paraphyses simple or sparingly branched near the tip, forming a much thinner epithecium..................*Lecanora*
  Thallus effigurate to squamulose..................................SQUAMARIA
    Apothecia adnate; thallus white-virescent..................*L. Babingtonii*
    Apothecial stalk highly developed, often appearing subpodetiiform.
      Apothecial margin yellowish ashy, crenulate, lobed, gemmiferous; thallus yellowish ashy...............................*L. Daltoniana*
      Apothecial margin ochraceous buff to light ochraceous buff, crenulate, not lobed, smooth; thallus light ochraceous buff...........*L. exsulans*
      Apothecial margin deep olive buff, smooth; thallus smoke gray to drab ....*L. Siplei*
  Thallus crustose...EULECANORA
    Thallus microphylline with ascending narrow laciniae.
      Laciniae 1–1.5 mm. long, black variegated, cortex 20 μ, fastigiate; apothecia 0.3–0.8 mm. in diameter..................*L. leucomelaena*
      Laciniae 6–7 mm. long, white straw color, cortex 30–60 μ, decomposed; apothecia 1–5 mm. in diameter......................*L. Charcotiana*
  Thallus uniform, granulose, verrucose, or areolate.
    Spores 12–22 × 7–12 μ.
      Thallus white to greenish ashy; apothecia 1–2 mm............*L. subfusca*
      Thallus rufescent; apothecia 0.75 mm., subimmersed; paraphyses corymbose-branched......................................*L. alutacea*
    Spores usually less than 15 × 8 μ.
      Thallus yellowish to greenish citrine.
        Thallus sorediose..............................*L. orostheoides*
        Thallus not sorediose.
          Epithecium dark.
            Thecium 60 μ; spores 10–15 × 5–5.5 μ.................*L. humillima*
            Thecium 80–90 μ; spores 7–11 × 5–7 μ.................*L. Gainiana*
          Epithecium pale.
            Thallus 2.5 mm. thick, rimose-rugose; thecium 120–140 μ...... ....*L. miranda*
            Thallus thinner.
              Apothecia 0.5–1.0 mm.; thallus inconspicuous......*L. Mons-Nivis*
              Apothecia larger.
                Apothecia substipitate.......................*L. aspidophora*
                  Thallus reduced; disc black, KOH green.........v. *aterrima*
                  Thallus granulose, verrucose, warts 1–3 mm., KOH yellow; disc reddish-flesh color, KOH–, apothecial stipe 1.5–3 mm....................................v. *errabunda*
                  Thallus verrucose, warts 2–4(–6) mm., KOH–; disc pale straw, KOH–, apothecial stipe 1–1.5 mm........v. *typica*

Apothecia sessile .... *L. polytropa*
Spores 12–13 × 6–8 μ; apothecia pale .... v. *leptacinoides*
Spores 10–13 × 4–5 μ.
Apothecia pale, thalline warts and areoles small, usually dispersed .... v. *illusoria*
Apothecia often blackened, areoles and warts usually contiguous .... v. *intricata*
Thallus white.
Hypothecium and paraphyses violet purple .... *L. atra* v. *vulgaris*
Hypothecium and paraphyses hyaline or nearly so.
Thallus thin, tartareous to obsolete .... *L. expectans*
Thallus smooth, areolate; disc fuscous black.
Apothecia 0.4–0.8 mm. .... *L. tephroeceta*
Apothecia 1–3 mm. .... *L. dancoensis*
Apothecia simple .... f. *normalis*
Apothecia proliferous .... f. *prolifera*
Thallus granulose to verrucose.
Apothecia 0.5–1.0 mm., margin white, lobulate .... *L. margaritae*
Apothecia 1–2 mm., margin fuscous .... *L. epibryon*
Thallus gray.
Apothecia 0.5 mm.; thalline warts 2–3(–5) mm. .... *L. poliophaeoides*
Apothecia 1–1.2 mm.; thallus powdery, granular.
Spores 10–12 × 4–5 μ, margin white; thallus very inconspicuous, saxicolous .... *L. lavae*
Spores 8.5–12.5 × 5–6 μ, margin gray; thallus granular, rugose, muscicolous .... *L. griseomarginata*
Thallus lilac to lilac fuscous, ecorticate.
Apothecia 1.2 mm.; spores 8–10 × 4–6 μ .... *L. lilacina*
Apothecia 0.65 mm.; spores 11.5–13 × 4.5–5.5 μ .... *L. lilacinofusca*
Thallus olive buff or brownish, corticate.
Apothecia usually over 1 mm.; spores 10–16 × 4–6 μ .... *L. badia*
Apothecia under 0.8 mm.
Spores 9–11 × 4–4.5 μ; medulla 50–60 μ .... *L. carbonacea*
Spores 13–15 × 4–6.5 μ; medulla 300 μ.
Apothecia 0.4 mm.; asci 46–48 × 12.5–14 μ; young spores appendiculate .... *L. fuscobrunnea*
Apothecia 0.75 mm.; asci 58–61 × 14–15 μ, young spores not appendiculate .... *L. subolivacea*

LECANORA **exsulans** (Th. Fries) Dodge & Baker, n. comb.

Lecanora chrysoleuca (Smith) Acharius var. *melanophthalma* (Ram.) Th. Fries, f. *exsulans* Th. Fries, Nyt Mag. Naturvidensk. **40**: 208. 1902.

Lecanora rubina (Vill.) Ach. var. *melanophthalma* (Ram.) Zahlbr. f. *exsulans* (Th. Fries) Zahlbr., Cat. Lich. Univ. **5**: 660. 1928.

Type: S. Victoria Land, Geikie Land [71° 40′ S., 170° E.], 100 m., *C. E. Borchgrevink* (in Upsala and Oslo).

Thallus in pulvinate tufts up to 2.2 cm. in diameter and 5–6 mm. high, rather fragile, deeply scrobiculate, thick, margin crenulate in young specimens, soon concealed by the apothecia which are sessile at first, becoming stalked, light ochraceous buff to ochraceous buff (dry).

Apothecia up to 4 mm. in diameter, disc light ochraceous buff at first, becoming dusky green, slightly pruinose, margin remaining concave, thin and smooth at first, becoming thicker and crenate, exciple smooth at first, becoming rugose-sulcate.

Growing over *Sarconeurum glaciale.*

SOUTH VICTORIA LAND: Geikie Land, 71° 40′ S. 170° E., 100 m., *C. E. Borchgrevink;* Newnes Land, 20 m., *C. E. Borchgrevink.*

LECANORA **Siplei** Dodge & Baker, sp. nov.

Pl. 47, figs. 146–151; pl. 63, figs. 413, 415.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-13.*

Thallus funiculatus aut in areolis ad 0.9 mm. diametro, coriaceus, aut sub apotheciis inconspicuus, griseo-fumatus vel ravus, fuscus madefactus, ad 650 μ crassitudine; cortex superior ad 40 μ crassitudine, fastigiatus, hyphis 1–2 μ diametro, pachydermaticis, strato gelifacto circa 4 μ crassitudine tectus; stratum gonidiale ad 100 μ crassitudine, protococcoideum, cellulis ad 10 μ diametro, raro in coloniis per totum thallum sparsis; medulla 300–500 μ crassitudine, hyphis 2–3 μ diametro, irregulariter reticulatimque implexis, densioribus circum algas; cortex inferior superiori similis cum cellulis isodiametricis obscuris exteris sparsis.

Apothecia ad 3 mm. diametro, singula aut in catervis ad 3 cm. diametro, plus minusve circularia, juventute marginibus inflexis, dein plana vel etiam repanda, marginibus crenulatis, obscure olivaceo-alutaceis, disco viridi-nigricante; amphithecium 120–150 μ crassitudine, cortex ut in thallo, sed strato gelifacto crassiori ad 50 μ, algae densissime per medullam compactae vel solo sub hypothecio; parathecium deest; hypothecium 8–10 μ crassitudine, hyphis tenuibus dense subpericlinalibus compactum, hyalinum; thecium 30–40 μ altitudine; paraphyses 1–1.5 μ, apicibus 1.5–2.5 μ diametro, gelifactis non obscuris, septati, simplices vel ramosi; epithecium 10–15 μ, hyalinum obscurascensque; asci 33–40 × 10–15 μ, clavati, vaginati; ascosporae octonae, 6.5–8 × 3.5–4.5 μ, late ellipsoideae, raro subreniformes, hyalinae.

Assimilative thallus up to several centimeters in diameter, in rugged strands or areolate, the areolae up to 0.9 mm., leathery, or inconspicuous and limited to the basal regions of the apothecia, hard and leathery when dry, smoke gray to drab, becoming flexible and fuscous when moist, up to 650 μ thick; upper cortex up to 40 μ thick, fastigiate, marginal hyphae free, subdistant, branched near the surface, 1 μ in diameter, expanding to terminal cells 2 μ in diameter, cell contents much reduced, covered by a gelified layer about 44 μ thick; algal layer up to 100 μ thick, protococcoid, cells up to 10 μ, sometimes scattered throughout the medulla which is 300–500 μ thick, of slender hyphae 2–3 μ in diameter, irregularly interwoven in a close net, denser about the algae; lower cortex similar to the upper with the same darkening near the base, also showing scattered dark pseudoparenchymatous cells on the outside.

Apothecia up to 3 mm. in diameter, single or in clusters as large as 3 cm. in diameter, more or less circular, deeply inrolled when young, opening to flat and even repand at maturity, sage green to deep slate olive or dull greenish black when well developed, light, plane or crenulate, deep olive buff or chamois, disc from sage-green to black; amphithecium 120–150 μ thick, cortex continuous and identical with that of the thallus; algae densely packed throughout the medulla or restricted to a layer beneath the hypothecium, the gelified layer on the outer surface up to 50 μ thick; parathecium not differentiated; hypothecium 8–10 μ thick, hyaline, of closely interwoven hyphae mostly periclinal; thecium 30–40 μ tall; paraphyses 1–1.5 μ, broadening to tips 1.5–2.5 μ, usually not darkened although frequently with enlarged gelified heads, septate, branched or simple; epithecium 10–15 μ, varying from light to dark; asci 33–40 × 10–15 μ, clavate, with a moderately thick gelified sheath, 8-spored; ascospores 6.5–8 × 3.5–4.5 μ, broadly ellipsoidal, rarely somewhat reniform, hyaline.

On soil from dark greenish gray slate and orthoclase-sericite-siderite schist.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-4, 72W-13,* type, *72W-14, 72W-15.*

LECANORA **griseomarginata** Dodge & Baker, sp. nov.

Pl. 47, figs. 152–156.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-1.*

Thallus 1–1.5 mm. diametro, crustosus, rugosus, inconspicuus, griseo-albus, mollis gelifactusque madefactus; cortex 20–30 μ crassitudine, cellulis parvis isodiametricis, strato gelifacto tectus; algae protococcoideae, ad 10 μ diametro, sparsae aut in strato 50 μ crassitudine basaliter dispositae; medulla 200–450 μ crassitudine, hyphis tenuibus laxe reticulatimque dispositis; cortex inferior non bene evolutus, cellulis obscurioribus, plus minusve amorphus cum cellulis magnis, liberis, obscuris, isodiametricis.

Apothecia ad 1.2 mm. diametro, irregulariter circularia, marginibus prominentibus, inflexis juventute, expansis repandisve maturitate, nigra, griseo-marginata; amphithecium 80–150 μ crassitudine, cortice ei thalli simili, cum paucis cellulis liberis obscuris isodiametricis; medulla cum eo thalli continua, algis lateraliter abundantibus, paucis sub hypothecio; parathecium 15–20 μ crassitudine, hyalinum; hypothecium centro 70 μ crassitudine, lateraliter ad 10 μ tenuescens, insuper in parathecium expansum; thecium 55–60 μ altitudine; paraphyses 0.5–1 μ, recti, simplices, cellulis apicalibus frequenter obscuris vagina 7 × 10 μ tectis, epithecium 10–12 μ, obscurum; asci 46–54 × 11–18.5 μ, late clavati maturitate; ascosporae octonae, 8.5–12.5 × 5–6 μ, ellipsoideae, hyalinae.

Thallus 1–1.5 mm. in diameter, crustose, rugose but quite inconspicuous, grayish white, mostly limited to the apothecial regions, when moist soft and somewhat gelified; cortex 20–30 μ thick, pseudoparenchymatous, of very small cells, covered by a thin gelified sheath which is often lacking in places and replaced by large dark isodiametric cells, which often penetrate the medulla a long way; algae up to 10 μ in diameter, protococcoid, scattered or in a zone about 50 μ thick in the basal region; medulla 200–450 μ thick, of loosely woven slender hyphae; lower cortex not differentiated beyond the darkening of cells which also become more or less amorphous, and the presence of free, large, dark, isodiametric cells.

Apothecia up to 1.2 mm. in diameter, irregularly circular, margin inrolled when young, expanded to almost repand at maturity, black with a gray margin; amphithecium 80–150 μ thick, cortex continuous with that of the thallus, with a few free dark isodiametric cells; medulla also continuous with that of the thallus, algae abundant laterally but few below the hypothecium; parathecium 15–20 μ, hyaline; hypothecium 70 μ thick in the center, thinning laterally to 10 μ and expanding above into the parathecium; thecium 55–60 μ tall; paraphyses 0.5–1.0 μ in diameter, straight, septate, simple, not expanding above but apical cell covered by a large gelified sheath 7 μ in diameter and 10 μ long, usually darkened, epithecium 10–12 μ, dark; asci 46–54 × 11–18.5 μ, broadly clavate at maturity, 8-spored; ascospores 8.5–12.5 × 5–6 μ, ellipsoidal, hyaline.

On loose sandy loam, on clumps of mosses and dark greenish gray slate.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-1*, type, *DW-3*; Skua Gull Peak, *P. Siple & S. Corey 72W-2, 72W-3, 72W-9, 72W-14*; Lichen Peak, *P. Siple & S. Corey 73-3, 73-4, 73-7*.

LECANORA **lilacina** Dodge & Baker, sp. nov.

Pl. 47, figs. 157–160.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-7*.

Thallus rarus, inconspicuus, granulosus, dilute lilacinus; ecorticatus; algae ad 12 μ diametro, protococcoideae, per totum thallum sparsae; medulla ad 200 μ crassitudine, hyphis 3–4 μ diametro, laxe implexis; cortex inferior deest.

Apothecia ad 1.2 mm. diametro, irregularia, repanda, marginibus crenulatis, olivaceis, umbrina obscuriorave, juventute lilacina, plana, emarginata; amphithecium 60–75 μ, cortex 30–40 μ, pseudoparenchymaticus, cellulis exteris obscurioribus; parathecium circa 5 μ crassitudine, hyalinum, hyphis periclinalibus; hypothecium centro circa 20 μ, lateraliter tenuescens, hyalinum; thecium 50–80 μ altitudine; paraphyses 1 μ diametro, sub apicibus ramosi, capitibus ad 3 μ diametro, septati, vaginati, gelifacti, epithecium 5–8 μ, hyalinum; asci 38–44 × 11–14 μ, breve clavati, vaginati; ascosporae octonae, 8–10 × 4–6 μ, late ellipsoideae, hyalinae, juventute vaginatae.

Assimilative thallus very scant, inconspicuous, granulose, pale drab gray; ecorticate; algae up to 12 μ in diameter, protococcoid, scattered throughout the thallus; medulla up to 200 μ thick, of rather coarse hyphae 3–4 μ in diameter, loosely woven; lower cortex absent. Myxophyceae, mostly *Stigonema,* cling to the outer surfaces, sometimes in well-defined patches but do not form true cephalodia.

Apothecia up to 1.2 mm. in diameter, irregularly circular, pale drab gray, flat and emarginate when young, becoming convex, Saccardo's umber to chaetura black with crenulate margins olive buff and light olive gray; amphithecium 60–75 μ, cortex 30–40 μ thick, pseudoparenchymatous, the outer cells somewhat darkened occasionally with patches of foreign algae; medulla identical and continuous with that of the thallus; parathecium about 5 μ thick, hyaline, of periclinal hyphae;

hypothecium hyaline, about 20 μ thick at the center, thinning rapidly toward the outer edge; thecium 50–80 μ high; paraphyses 1 μ, heads 3 μ expanding abruptly, branched just below the tips, septate with a thick sheath, outer surfaces a little darkened, gelified, epithecium 5–8 μ, hyaline; asci 38–44 × 11–14 μ, short- but slender-clavate with a thick sheath, 8-spored; ascospores 8–10 × 4–6 μ, hyaline, broadly ellipsoidal, with a sheath when young.

On sandy loam, light pink leucogranite, and gray slate.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1;* Lichen Peak, *P. Siple & S. Corey 73-4, 73-7,* type.

LECANORA **lilacinofusca** Dodge & Baker, sp. nov.
Pl. 48, figs. 161–166.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-4.*

Thallus ad 0.95 mm. diametro, inconspicuus, lilacino-fuscus, mollissimus gelifactusque madefactus; ecorticatus; algae ad 15 μ diametro, protococcoideae, coloniis parvis per totum thallum sparsae; medulla ad 500 μ crassitudine, hyphis tenuibus, 1 μ diametro, laxissime implexis, compactioribus ad margines apotheciaque; stratum basale deest.

Apothecia ad 0.65 mm. diametro, irregularia, marginata, concava et alba juventute dein griseo-brunnea, sessilia; amphithecium 50–60 μ crassitudine, cortex circa 10 μ crassitudine, male evolutus, pseudoparenchymaticus, medulla compacta, reticulata, algae sparsae aut in coloniis; parathecium paucis cellulis male evolutum; thecium 50–70 μ altitudine; paraphyses circa 1 μ diametro, capitibus 5 μ diametro, obscure viridibus brunneisve, simplices aut sub apicibus ramosi, septati, vaginati, epithecium viridi-brunneum, 8–10 μ crassitudine; asci 48–55 × 13–16 μ, elongato-clavati, vaginati; ascosporae octonae, 11.5–13 × 4.5–5.5 μ, ellipsoideae, apicibus subacutis obtusisve, hyalinae.

Assimilative portions up to 0.95 mm. in diameter, inconspicuous, brownish-drab, very soft and gelified when moist; cortex absent; algae up to 15 μ in diameter, protococcoid, rare, scattered throughout the thallus in small colonies; medulla up to 500 μ thick, of slender hyphae about 1 μ in diameter, very loosely woven, slightly more compact near the margins and apothecia; basal layer not developed.

Apothecia up to 0.65 mm. in diameter, irregularly circular, concave when young with a slight margin at maturity, white becoming dark gray-brown, sessile, scant; amphithecium 50–

60 μ thick, cortex about 10 μ thick, poorly developed, pseudoparenchymatous, becoming indistinct below at the confluence with the thallus, algae rather abundant, scattered throughout, singly or in groups; parathecium scarcely distinguishable, limited to a few cells at the apothecial margin; hypothecium about 20 μ thick, compact, of slender interwoven hyphae; thecium 50–70 μ tall; paraphyses about 1 μ in diameter expanding to heads about 5 μ in diameter, dark green to brown, septate with a close sheath, epithecium 8–10 μ thick, greenish-brown; asci 48–55 × 13–16 μ, elongate-clavate with a moderate sheath, 8-spored; ascospores 11.5–13 × 4.5–5.5 μ, ellipsoidal, the ends sometimes a little pointed, mostly blunt, hyaline.

Among mosses on loose sandy loam.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-4*, type.

LECANORA **carbonacea** Dodge & Baker, sp. nov.

Pl. 46, figs. 142–145.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Mt., *P. Siple & S. Corey 72W-6.*

Thallus ad 1 mm. diametro, crustosus, plus minusve continuus, subgranulosus, sparsus, inconspicuus madefactus, alutaceus; cortex 20–30 μ, fastigiatus, reticulatusve aut paucis cum cellulis obscuris isodiametricis; algae protococcoideae, ad 10 μ diametro, sparsae vel in strato 30–60 μ crassitudine sub cortice dispositae; medulla 50–60 μ crassitudine, hyphis laxe reticulatimque dispositis; cortex inferior non bene evolutus, paucis cellulis obscuris isodiametricis sparsis.

Apothecia ad 0.75 mm. diametro, applanata, margine subcrenulata, nigra, carbonacea; amphithecium 50–70 μ crassitudine; cortex bene evolutus, ei thalli similis; parathecium 20–35 μ crassitudine, cellulis fastigiatis, exteris obscuris; hypothecium centro 20–30 μ crassitudine, lateraliter tenuescens ad 10 μ crassitudine, hyalinum; thecium 40–50 μ altitudine; paraphyses 0.75–1.0 μ diametro, septati, non ramosi, capitibus ad 5 μ diametro, obscuris, epithecium 5–12 μ, subvirescens, KOH–; asci 37–43.5 × 12–15 μ, breviter clavati, basi obtusi latique, vaginati; ascosporae octonae, (8–) 9–11 × 4–4.5 μ, ellipsoideae vel subreniformes aut ovoideae, hyalinae.

Thallus up to 1 mm. in diameter, crustose, more or less continuous, somewhat granulose when soaked and loosened from the rock, scattered, inconspicuous, dull tan; cortex 20–30 μ thick, fastigiate, closely interwoven, or sometimes lacking except for a few scattered dark isodiametric cells; algae up to 10 μ in diameter, protococcoid, scattered in the thallus or in a layer 30–60 µ thick below the cortex; medulla 50–60 µ thick, of loosely reticulate hyphae, occasionally more or less amorphous near the base; lower cortex not differentiated beyond dark isodiametric cells, scattered and not continuous.

Apothecia up to 0.75 mm. in diameter, flattened, more or less circular in outline with a suggestion of a crenulate margin and a faint rim, black, very carbonaceous; amphithecium 50–70 µ thick; cortex well developed, with abundant algae, of the same structure as the thallus; parathecium 20–35 µ thick, of fastigiate cells, the outer ones darkened; hypothecium 20–30 µ thick in the center, thinning laterally to 10 µ or less, then expanding upward into the parathecium, hyaline, similar to the cortex but more compact; thecium 40–50 µ tall; paraphyses 0.75–1.0 µ in diameter, slender, septate, usually unbranched (if so, at a considerable distance from the apex), expanding to large heads 5 µ in diameter, with a thick dark cap, epithecium 5–12 µ thick, dark greenish, KOH–; asci 37–43.5 × 12–15 µ, short-clavate, blunt and rather broad at the base with a moderately prominent sheath, 8-spored; ascospores (8–) 9–11 × 4–4.5 µ, ellipsoidal to slightly reniform or ovoid, hyaline.

On fine-grained dike rock.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-6.*

LECANORA **fuscobrunnea** Dodge & Baker, sp. nov.

Pl. 48, figs. 172–175.

Type: South Victoria Land, Queen Maud Mts., Durham Point, northeast portal of Thorne Glacier, *Q. A. Blackburn, R. S. Russell, Jr. & S. D. L. Paine QM-4.*

Thallus ad 0.75 mm. diametro, rarus, granulosus, fusco-brunneus albusve, mollis madefactus; cortex pseudoparenchymaticus stratis singulo aut duobus cellularum, insuper cum strato gelifacto ad 50 µ crassitudine; algae ad 15 µ diametro, protococcoideae, rarae, in parte superiore sparsae; medulla ad 300 µ crassitudine, hyphis tenuibus, 1–3 µ, reticulatim et raro laxe dispositis; cortex inferior superiori similis sine strato gelifacto.

Apothecia ad 0.4 mm. diametro, marginata emarginatave, nigra, carbonacea, sessilia; amphithecium 50–70 µ crassitudine, cortex ei thalli similis; algae abundantes, stratum 50 µ crassitudine sub hypothecio formantes; parathecium non evolutum, paucis cellulis inter amphithecium theciumque exceptis; hypothecium circa 10 µ crassitudine, hyalinum, hyphis compacte reticulatimque dispositis; thecium circa

50–60 μ altitudine; paraphyses 1–1.5 μ, sub apice ramosi, capitibus circa 3.5 μ diametro, septati, epithecium obscurum, 10 μ crassitudine, insuper cum strato gelifacto 5–15 μ, KOH–; asci 46–48 × 12.5–14 μ, obtuse clavati; ascosporae octonae, 13–15 × 4–6 μ, ellipsoideae, appendiculatae juventute, vaginatae, hyalinae.

Assimilative thallus up to 0.75 mm. in diameter, scant, granulose, drab brown to white, soft when moistened; cortex of brown to fuscous pseudoparenchyma in one or two layers of cells, denser near the base with a gelified layer on the outer surfaces up to 50 μ thick; algae up to 15 μ in diameter, protococcoid, scattered, in the upper part of the thallus not numerous; medulla up to 300 μ thick, of slender, closely reticulate hyphae 1–3 μ in diameter, occasionally with quite open meshes; lower cortex identical with the upper without the gelified layer on the surface.

Apothecia up to 0.4 mm. in diameter, irregularly circular, emarginate or with a faint rim, black, carbonaceous, sessile; amphithecium 50–70 μ thick, cortex as in the thallus; algae abundant, especially beneath the hypothecium where they often form a layer 50 μ thick; medulla identical and continuous with that of the thallus; parathecium not differentiated save for a few cells between epithecium and amphithecium; hypothecium about 10 μ thick, hyaline, of closely reticulate hyphae; thecium about 50–60 μ tall; paraphyses 1–1.5 μ in diameter, branched near the tips, septate, expanding to heads about 3.5 μ in diameter, slightly darkened on the outside, epithecium dark, about 10 μ thick with a gelified layer 5–15 μ thick, not changing color with KOH; asci 46–48 × 12.5–14 μ, bluntly clavate, 8-spored; ascospores 13–15 × 4–6 μ, ellipsoidal, hyaline, with a thin sheath, when young with appendages at the lower ends which later break off.

On granitic sandy loam.

SOUTH VICTORIA LAND: Queen Maud Mts., Durham Point, northeast portal of Thorne Glacier, *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-4.*

LECANORA **subolivacea** Dodge & Baker, sp. nov.

Pl. 48, figs. 167–171.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7.*

Thallus ad 0.65 mm. diametro, rarus, subolivaceus, pulvinatus, irregulariter circularis, sparsus aut gregarius, mollis madefactus; cortex ad 30 μ crassitudine, fastigiatus aut ad apothecium pseudoparenchymaticus, cellulis ad 3 μ diametro; algae ad 10 μ diametro, protococcoideae, rarae, coloniis parvis sparsis; medulla ad 300 μ crassitudine, hyphis tenuibus, circa 2 μ diametro, insuper compactis, centro laxissime implexis, basaliter subpericlinalibus; cortex inferior deest.

Apothecia ad 0.75 mm. diametro, pulvinata, emarginata, olivacea nigrave, non nitida, sparsa, singula; amphithecium 80–90 μ crassitudine, cortex 10–30 μ, pseudoparenchymaticus, algae abundantes; parathecium 10–20 μ crassitudine, male evolutum; hypothecium 10–20 μ, hyalinum, non tenuescens; thecium 70–80 μ altitudine; paraphyses 1–1.5 μ diametro, septati, gelifacti, capitibus 3 μ, simplices aut sub capitibus ramosi; epithecium 5–10 μ, obscurum, gelifactum, KOH addito virescens; asci 58–61 × 14–15 μ, tenuiter clavati; ascosporae octonae, 14–15 × 5–6.5 μ, ellipsoideae vel subovoideae, hyalinae.

Assimilative thallus up to 0.65 mm. in diameter, scant, pale olive buff to olive buff, limited to separate pulvinate areolae, irregularly circular, later almost entirely covered by apothecia, scattered or closely clustered, soft when moist; cortex up to 30 μ thick, fastigiate in places, usually pseudoparenchymatous near the apothecium, the cells about 3 μ in diameter; algae up to 10 μ in diameter, protococcoid, rare, in small colonies scattered throughout the thallus; medulla about 300 μ thick, of slender hyphae about 2 μ in diameter, closely reticulate above, very loose in the center and in more or less periclinal strands below; lower cortex not differentiated.

Apothecia up to 0.75 mm. in diameter, pulvinate, without a prominent margin, olive buff to citrine drab or black, not shining, scattered and usually single; amphithecium 80–90 μ thick, cortex 10–30 μ, pseudoparenchymatous, algae abundant throughout; medulla identical and continuous with that of the thallus; parathecium 10–20 μ thick, scarcely distinguished except the few outer cells whose exposed surfaces are darkened as those of the epithecium; hypothecium hyaline, 10–20 μ thick, fibrous, not tapering; thecium 70–80 μ tall; paraphyses 1–1.5 μ, conspicuously septate, expanding to heads up to 3 μ, gelified but not darkened, simple or branched near the tips; epithecium 5–10 μ thick, dark, gelified, turning green with KOH; asci 58–61 × 14–15 μ long, slender-clavate, more broadly so at maturity, 8-spored; ascospores 14–15 × 5–6.5 μ, ellipsoidal to slightly ovoid, hyaline.

On coarse-grained granite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7.*

CANDELARIELLA

CANDELARIELLA Müll. Arg., Bull. Herb. Boiss. **2**: app. 1: 11. 1894.

The type species is *Candelariella vitellina* (Ach.) Müll. Arg.

Thallus crustose, uniform, horny, verrucose or effigurate (sect. *Caloplacopsis*), bright yellow, not colored red by KOH, attached to the substrate by hyphae of the prothallus or of the medulla, without rhizinae, heteromerous; with *Protococcus*. Apothecia sessile, circular, yellow, not colored red by KOH, lecanorine; hypothecium hyaline with algae below; paraphyses unbranched, non-septate or septate near the tip; asci 8- to many-spored; ascospores hyaline, elongate to ellipsoidal, 1–2-celled with thin septum and walls. Spermogonia very small, punctiform, yellow, spermatiophores scantily septate, forked or branched, short-celled; spermatia short, straight.

No previous reports from Antarctica.

Candelariella chrysea Dodge & Baker, sp. nov.

Pl. 49, figs. 181–191.

Type: Marie Byrd Land, Edsel Ford Range, Chester Mts., *P. Siple & S. Corey 97A-1.*

Thallus conspicuus, pars non-assimilans 250 μ crassitudine, funiculis nigris sub parte assimilativa, cortex 10–30 μ, pseudoparenchymaticus; medulla 150–200 μ crassitudine, cellulis hyalinis; stratum basale ad 50 μ crassitudine, cellulis pachydermaticis brunneis; pars assimilans ad 500 μ crassitudine, cadmii flava, KOH addito immutata, verrucosa; cortex 20–50 μ crassitudine, pseudoparenchymaticus, paucis cellulis fastigiatis exteris, raro cum strato cellularum emortuarum tectus; algae per totam areolam sparsae, cellulis 3–3.5 μ diametro, protococcoideis; medulla circa 350 μ crassitudine, cellulis regularibus compactisque; stratum basale ad 25 μ crassitudine, cortici simile; isidia plus minusve spherica, 100 μ diametro, cortex ad 10 μ crassitudine, pseudoparenchymaticus, algae abundantes, medulla hyphis laxe reticulatimque implexis.

Apothecia 0.5–2 mm. diametro, irregularia vel circularia, marginibus subcrenulatis, non inflexis, sparsa vel gregaria, sessilia in areolis assimilantibus, ochraceo-aurantia; parathecium ad 75 μ crassitudine, ex hypothecio oriens, cellulis tenuibus insuper ramosis, corticem efficiens; hypothecium circa 50–60 μ crassitudine, cellulis isodiametricis verticaliter dispositis, in medullam mergens, hyalinum; thecium ad 175 μ altitudine; paraphyses 1 μ, apicibus 1.5–2.5 μ diametro, clavatis, ramosi vel non ramosi, evaginati, septati; asci 57–84 × 17–25 μ, polyspori, late clavati, vaginati; ascosporae 10–15 × 4.5–7 μ, ellipsoideae vel subreniformes, raro guttulatae, hyalinae, unicellulares.

Thallus conspicuous over areas of several centimeters, occasionally on rocks but usually with mosses and amongst gravel and soil; non-assimilative portion up to 250 μ thick, macroscopically of blackened strands below the assimilative portions; upper cortex from 10 to 30 μ thick, of regular isodiametric cells with only moderately thickened walls; medulla 150–200 μ thick, of hyaline cells with progressively thinner walls from the cortex to the center; basal cortex up to 50 μ thick, very well developed, of thick-walled cells in a compact layer, brown; assimilative portion up to 500 μ thick, verrucose, cadmium yellow, no color change with KOH; cortex 20–50 μ thick, of regular pseudoparenchyma with a few dark fastigiate cells scattered on the outer surface, occasionally a layer of dead cortical cells outside the fastigiate cells; algae protococcoid, scattered throughout the areole, cells 3–3.5 μ in diameter; medulla about 350 μ thick, of regular and compact cells;.basal layer up to 25 μ, not morphologically differentiated from the cortex; isidia more or less spherical, about 100 μ in diameter with a pseudoparenchymatous cortex up to 10 μ thick, internally of loose reticulate hyphae and abundant algae.

Apothecia 0.5–2 mm. in diameter, irregular to circular with the margin slightly crenulate, not inrolled, scattered or in groups, sessile on the assimilative areolae, ochraceous orange; parathecium up to 75 μ thick, spreading from the hypothecium, of slender cells branching at the surface to form the cortex; hypothecium 50–60 μ thick, of cells closely arranged in a palisade, disappearing basally as it merges with the cells of the compact medullar tissue, hyaline; thecium up to 175 μ tall; paraphyses 1 μ in diameter expanding to slightly enlarged apices about 1.5–2.5 μ, clavate, branched or unbranched, without a sheath, septate; asci 57–84 × 17–25 μ, polysporous, broadly clavate with a well-developed gelified sheath; ascospores 10–15 × 4.5–7 μ, ellipsoidal to somewhat reniform, occasionally with faint oil droplets, hyaline.

The exposed surfaces of the assimilative, non-assimilative

and apothecial parts are frequently blackened by the abundance of a dematiaceous hyphomycete. The parasitic cells vary in size (see pl. 49, figs. 181, 182), sometimes surrounding completely a few algae in a more or less spherical mass (see pl. 49, fig. 183a) which possibly function as soredia.

On sandy loam and coarse-grained gray granodiorite.

MARIE BYRD LAND: Edsel Ford Range, Chester Mts., *P. Siple & S. Corey 97A-1*, type, *97A-2*; Lichen Peak, *P. Siple & S. Corey 73-3.*

CANDELARIELLA **albovirens** Dodge & Baker, sp. nov.
Pl. 48, figs. 176–178; pl. 49, figs. 179–180b.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Corey, *P. Siple & S. Corey 112E-2.*

Thallus non assimilans funiculis radiantibus 1–2 mm. longitudine, nigris; areae assimilantes ad 2 mm. diametro, crustosae vel areolatae, arachnoideae, albae, flavovirentes; cortex ad 25 μ crassitudine, non continuus, cellulis fastigiatis confertis, exteris obscuris; stratum gonidiale 20–30 μ crassitudine, cellulis ad 8 μ diametro, raro sparsis; medulla 300–450 μ crassitudine, hyphis circa 3 μ diametro, ramosis, laxe reticulatimque dispositis; cortex inferior non evolutus, paucis cellulis isodiametricis obscuris sparsis.

Apothecia ad 1.5 mm. diametro, concava vel plana maturitate, cylindrica basi attenuata, subsessilia vel sessilia, flava viridiave maturitate, gregaria vel singula; amphithecium 150–180 μ crassitudine, cortex ad 30 μ crassitudine, fastigiatus, continuus cum eo thalli; algae sparsae, abundantes; parathecium non evolutum; hypothecium 40–50 μ crassitudine, hyphis periclinalibus, verticaliter in centro dispositis, densum, hyalinum; thecium 40–60 μ altitudine; paraphyses 1–2 μ diametro, apicibus 3 μ, obscuris, non ramosi, recti, raro e cellulis penultimis ultimisve ramosi, septati, leptodermatici, guttulati, KOH addito subvirescentes; epithecium circa 5 μ crassitudine, tenue, hyalinum; asci 30–35 × 9.5–13 μ, breviter clavati; ascosporae octonae, 7–11 × 3–4 μ, ellipsoideae vel reniformes, hyalinae.

Non-assimilative portions of the thallus represented by black rhizoidal strands radiating for 1–2 mm. from the assimilative and apothecial regions; assimilative parts up to 2 mm., limited almost entirely to the basal portions of apothecia, scant, crustose, areolate to arachnoid, white to yellowish green; cortex up to 25 μ, not continuous over the whole surface, of fastigiate closely packed cells, the outer ones sometimes darkened with occasional scattered patches of dark isodiametric cells; algal layer 20–30 μ thick, protococcoid, cells up to 8 μ in diameter, parallel to the apothecium, rarely scattered in the thallus; medulla 300–450 μ thick, of loosely woven branched

hyphae 3 μ in diameter; lower cortex not developed, covered basally by a few dark isodiametric scattered cells.

Apothecia up to 1.5 mm. in diameter, more or less circular, concave to plane at maturity, cylindrical with attenuated bases, subsessile to sessile, white when young, yellow to green at maturity, gregarious or single; amphithecium 150–180 μ thick, cortex up to 30 μ thick, fastigiate, continuous with that of the thallus, medulla continuous with the thalline medulla, algae scattered, abundant; parathecium not differentiated; hypothecium 40–50 μ thick, of hyphae periclinal toward the sides of the apothecium, but erect and vertical toward the center, dense, hyaline; thecium 40–60 μ tall; paraphyses 1–2 μ in diameter, expanding above, the apical cells up to 3 μ in diameter, darkened on the outer layers, occasionally with a dark encrusting mass adhering to them, mostly simple, straight, septate, sometimes branching from the ultimate or penultimate cells, thin-walled, with conspicuous oil droplets, slightly green with KOH, epithecium about 5 μ, hyaline; asci 30–35 × 9.5–13 μ, short-clavate, 8-spored; ascospores 7–11 × 3–4 μ, slender, ellipsoidal to reniform, hyaline.

On coarse-grained granite and highly weathered coarse-grained leucogranite, quartzite, dark greenish gray slate, and sericite-orthoclase schist.

Marie Byrd Land: Edsel Ford Range, Mt. Corey, *P. Siple & S. Corey 112E-2*, type; Chester Mts., *P. Siple & S. Corey 97A-3;* Lichen Peak, *P. Siple & S. Corey 73-1, 73-10;* Skua Gull Peak, *P. Siple & S. Corey 72W-7.*

King Edward VII Land: Rockefeller Mts., Mt. Helen Washington, *P. Siple & S. Corey HW-11, HW-13.*

LECANIA

Lecania Massalongo, Alcun. Gen. Lich. 12. 1855.

The type species is *Lecania fuscella* Mass.

Thallus crustose, uniform, effigurate, squamose or dwarf-fruticose, attached to the substrate by the hyphae of the prothallus or of the medulla, without rhizinae, heteromerous; ecorticate or corticate; algae *Protococcus;* medulla loosely woven, of thin-walled hyphae. Apothecia sessile, round, lecanorine; parathecium lacking, incompletely or well developed; hypothecium hyaline with algae below; paraphyses unbranched; asci normally 8, exceptionally 16–32-spored; ascospores hyaline, elongate to ellipsoid, straight or curved, 2- or more celled, thin-walled with cylindric cells.

The genus is usually divided into three sections (for characters see key to family, p. 568). *Thamnolecania* and *Eulecania* seem to be confined to the Antarctic Archipelago, although *Catillaria inconspicua* from Marie Byrd Land may belong in *Eulecania* as algae are found below the hypothecium but only at the margins.

KEY TO ANTARCTIC SPECIES

Thallus crustose, uniform, white or grayish..........................EULECANIA
  Hypothallus white..*L. Racovitzae*
  Hypothallus black..........................*Catillaria inconspicua* (p. 548)
Thallus fruticulose, ascospores 4-celled..........................THAMNOLECANIA
  Ascospores 13–24 × 3–4.5 μ; thallus 6–13 mm. high..............*L. Brialmonti*
  Ascospores 10–14 × 4.5–5 μ; thallus 3–5 mm. high................*L. Gerlachei*
  Ascospores 11–15 × 4 μ; thallus 10–12 mm. high, yellowish fuscescent....
  ....*L. cariosa*

PARMELIACEAE

Thallus foliose, resupinate to erect and almost fruticose, often attached to the substrate by rhizinae, dorsiventral; usually corticate on both surfaces, rarely ecorticate below *(Anzia);* algae protococcoid, lower surface nearly nude or more usually covered with rhizinae which rarely anastomose to form a spongy hypothallus *(Anzia* and *Pannoparmelia);* cyphellae present in *Pseudoparmelia* only. Apothecia circular, sessile to short-stipitate, amphithecium well developed; paraphyses branched or unbranched, often imbedded in a gel; asci 6–8-spored (16–32-spored in *Anzia* and *Candelaria);* ascospores hyaline, unicellular.

Of the eleven commonly recognized genera of this family, only *Parmelia* and *Pannoparmelia* have been found in the Antarctic.

KEY TO ANTARCTIC SPECIES OF PANNOPARMELIA, PARMELIA, AND PHYSCIA

Rhizinae anastomosing to form a dense spongy hypothallus; laciniae narrow, appressed; ascospores small, subspherical..................PANNOPARMELIA
  Laciniae 0.7–1.0 mm. broad, subdichotomous, tips truncate, white...*P. pellucida*

Laciniae 0.3–0.6 mm. broad, irregularly branched, tips rounded, becoming gray and darkening..*P. delicata*

Rhizinae not conspicuously anastomosing nor forming a hypothallus; laciniae larger; ascospores ellipsoidal, ovoid or spherical..................*Parmelia*

Cortex of branched hyphae perpendicular to the surface of the thallus, cells more or less isodiametric, often giving the appearance of pseudoparenchyma in both upper and lower cortex......................EUPARMELIA

Laciniae yellow, KOH yellow, verruculose granulose......*Parmelia Gerlachei*

Laciniae pale fuscous, KOH–, smooth......................*Physcia fuscella*

Upper cortex appearing pseudoparenchymatous above and often extending to the under-side of the tips of the lobes for a short distance; lower cortex of conglutinate slender periclinal hyphae, or decomposed..PHYSCIOIDEAE

Thallus sorediose.

Thallus KOH– above.

Thallus pale straw to yellowish, 0.5–1.5 cm.; laciniae 1–2.5 mm. broad; soredia 1 mm., spherical, often eventually covering much of the upper surface; saxicolous...............*Physcia xanthotropa*

Thallus white, blackening, up to 3 cm.; laciniae 5–6 × .5–1 mm., soredia marginal; muscicolous..........................*Physcia Leoniae*

Thallus KOH yellowing above.

Soredia confined to the under-side of the tips of the laciniae; medulla KOH–....................................*Physcia tribacia*

Soredia scattered on the upper surface of the laciniae.

Margin with long white branched fibrils (cilia)..*Parmelia leucoblephara*

Margin eciliate.

Laciniae 0.6–0.8 mm., dichotomous, tips truncate, yellowish rarely graying; soredia eroded, common..................*P. variolosa*

Laciniae 0.4–0.5 mm., flabellate, tips rounded, gray and blackening, soredia eroded, rare.........................*P. Coreyi*

Laciniae 0.5–1.10 mm., polychotomous, tips dilated, white to bluish gray, soredia spherical........................*Physcia caesia*

Thallus minutely isidiose, chestnut to black in the center, paler at margin; laciniae 0.5–0.8 mm. broad; medulla KOH slightly reddish..*Parmelia acervata*

Thallus neither sorediose nor isidiose.

Thallus black-margined, straw to white; laciniae 1–2 mm. broad, 5–7 mm. long, tips rounded; KOH–................*Physcia puncticulata*

Thallus black variegated, yellow tabacine, KOH slightly yellowing; laciniae 0.4–0.6 mm. broad, tips crenulate...........*Physcia tabacina*

Thallus neither black variegated nor black-margined.

Thallus ashy rufescent, pruinose above, KOH–....*Physcia pulverulenta*

Thallus whitish or grayish.

KOH rufescent; thallus pale olive buff then gray; laciniae 0.2–0.3 mm...*Parmelia griseola*

KOH yellow.

Ascospores 10.5–14.5 × 3.5–4.5 μ; thallus gray and darkening; laciniae 0.8–1.0 mm..........................*Parmelia Coreyi*

Ascospores 16–26 × 8–11 μ; thallus white or glaucous; laciniae 1–2(–3) mm. . . . . *Physcia stellaris* v. *adpressa*

KOH– above.

Laciniae 1–2 mm. broad, tips dilated, ashy, scattered; rhizinae fuscous. . . . . *Physcia disseminata*

Laciniae 0.5–0.7 mm. broad, tips dilated; rhizinae white, nigrescent. . . . . *Physcia inordinata*

Laciniae 0.2–0.4 mm. broad, tips not dilated; rhizinae white . . . . *Physcia nitescens*

PANNOPARMELIA

PANNOPARMELIA Darbishire, Wiss. Ergebn. Schwed. Südpolar-Exp. 1901–1903. **4**^{11}: 11. 1912.

Anzia sect. *Pannoparmelia* Müll. Arg., Flora **72**: 507. 1889.

The type species is *P. angustata.* (Pers.) Darb.

Thallus foliose, laciniate, lobes elongate, narrow, appressed; upper cortex fastigiate; algae protococcoid; medulla loosely woven; lower cortex well developed, producing an anastomosing network of rhizinae which form a hypothallus, giving the appearance of *Pannaria.* Apothecia sessile on the upper surface, amphithecium well developed, epithecium amorphous; hypothecium hyaline with algae below; paraphyses imbedded in a gel; asci 8-spored; ascospores small, subspherical, thin-walled. Spermogonia unknown.

At first sight this genus appears to be a small *Pannaria* with a very highly developed brownish black hypothallus, but has protococcoid algae, and a parmelioid apothecium. *P. angustata* (Pers.) Darb. was described from New Zealand, and *P. anzioides* Darb. (*P. Darbishireana* Zahlbr.) from Tierra del Fuego. The well-developed lower cortex, with the anastomosing rhizinae forming a prominent hypothallus, makes it possible to recognize the genus even in the sterile condition.

PANNOPARMELIA **pellucida** Dodge & Baker, sp. nov.
Pl. 63, fig. 417; pl. 64, figs. 418, 421, 422.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1.*

Thallus ad 1.5 cm. diametro, laciniatus, laciniae 0.7–1.0 mm. latitudine, subdichotome ramosae, subtruncatae, albidus, subpellucidus, minute pruinosus; cortex superior 15 μ crassitudine, pseudoparenchymaticus, 2–3 stratis cellularum pachydermaticarum; algae non visae; medulla 90–100 μ crassitudine, arachnoidea, hyphis verticalibus 2–3 μ diametro, leptodermaticis, reticulatim dispositis; cortex inferior 20–30 μ crassitudine, hyphis periclinalibus conglutinatis; rhizinae 40–50 μ diametro, hyphis tenuibus longitudinalibus conglutinatis.

Thallus up to 1.5 cm. in diameter, laciniate, laciniae 0.7–1.0 mm. broad, subdichotomously branched, rather truncate, white, subpellucid, minutely pruinose; upper cortex 15 μ thick, pseudoparenchymatous, of 2–3 layers of thick-walled large cells; algae not seen; medulla 90–100 μ thick, arachnoid, of thin-walled vertical hyphae 2–3 μ in diameter, loosely tangled to reticulate; lower cortex 20–30 μ thick, of periclinal hyphae imbedded in a deeply staining gel; rhizinae 40–50 μ in diameter, of gelified slender longitudinal hyphae, anastomosing into a spongy network and forming a hypothallus which extends some distance beyond the laciniae, giving the appearance of a species of *Pannaria.*

It is with some hesitation that we have described this as a new species. The rhizinae and lower portion of the medulla are invaded by a dematiaceous fungus which reaches the upper cortex in one place. It would seem to be an old thallus from which the algae have completely disappeared, and to show no trace of apothecia.

On sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1*, type.

PANNOPARMELIA **delicata** Dodge & Baker, sp. nov.
Pl. 63, fig. 417; pl. 64, figs. 419, 420, 423.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1.*

Thallus ad 1 cm. diametro, laciniatus, laciniae 0.3–0.6 mm. latitudine, subdichotome vel irregulariter ramosae, apicibus rotundatis, albidus dein griseus et obscurascens; cortex superior 7–10 μ crassitudine, gelifactus amorphusque; algae rarae, protococcoideae, 5–6 μ diametro sub cortice, sparsae; medulla 55–60 μ crassitudine, arachnoideae, hyphis 2–3 μ diametro, reticulatim dispositis; cortex inferior 10–15 μ, gelifactus, hyphis periclinalibus; rhizinae cylindricae, 40–45 μ diametro, hyphis longitudinalibus, 2 μ diametro, conglutinatis, hyalinis, exteris subbrunnescentibus, reticulatim anastomosantes.

Apothecia sessilia, subterminalia?, 160–170 μ diametro, marginata; cortex 5–7 μ, gelifactus; amphithecium 20–25 μ crassitudine, hyphis tenuibus reticulatim dispositis; hypothecium 7–10 μ, hyphis tenuibus periclinalibus, hyalinum, gelifactum; thecium 30 μ altitudine; paraphyses tenues, gelifacti; asci cylindrici; ascosporae sphericae, unicellulares, 3 μ diametro. Thecium evanescens; soredia subspherica, 30 μ diametro, cellulis 4–6 algarum pseudoparenchymatice corticatis amphithecium implentia.

Thallus up to 1 cm. in diameter, laciniae 0.3–0.6 mm. broad, subdichotomously or irregularly branched, tips rounded, white, then gray and darkening, opaque; upper cortex 7–10 μ thick, deeply staining but gelified and amorphous; algae very rare, protococcoid, 5–6 μ in diameter; medulla 55–60 μ thick, arachnoid, of reticulately arranged hyphae 2–3 μ in diameter; lower cortex 10–15 μ thick, gelified, of periclinal hyphae; rhizinae cylindric, 40–45 μ in diameter, of conglutinate longitudinal hyaline hyphae 2 μ in diameter, outer hyphae browning, anastomosing into a dense network which forms a hypothallus extending beyond the laciniae.

Apothecia sessile and apparently subterminal on the lobes, 160–170 μ in diameter, marginate; cortex 5–7 μ thick, deeply staining and completely gelified; amphithecium 20–25 μ thick, of slender hyphae in a network, much as in the medulla; hypothecium 7–10 μ thick, of slender hyaline periclinal hyphae, gelified; thecium 30 μ tall; paraphyses slender, gelified; asci cylindric, 8-spored; ascospores spherical, unicellular, thin-walled, 3 μ in diameter.

In our material the thecium has largely disappeared and been replaced by a layer of spherical soredia 30 μ in diameter with 4–6 algal cells surrounded by a pseudoparenchyma. The characters of the thecium above reported are from a single portion remaining between two soredia. Even this portion has begun to gelify so that the height of the thecium may be too little. The thallus has apparently been invaded by the same dematiaceous fungus which is invading *P. pellucida* on the same rock, but the invasion is much less severe. There is sometimes a layer of large brownish obovoid cells just below the gelified upper layer (called cortex above). The interpretation is uncertain as the cells are not uniform in distribution. It is possible that they represent the terminal swollen cells of a fastigiate cortex such as has been reported in *P. anzioides,* and the gelified layer is a layer of dead cells so frequent in our Antarctic material. These swollen cells have also been seen in the apothecium where one would expect cortical cells but here also their distribution is not uniform.

On sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1.*

PARMELIA

PARMELIA Acharius, Meth. Lich. 153. 1803.

Imbricaria Acharius, K. Vetensk. Akad. Nya Handl. **15**: 250. 1794; Michaux, Fl. Bor.-Am. **2**: 322. 1803; Lamarck & DeCandolle, Fl. Franç. ed. 3. **2**: 385. 1805.

Physcia S. F. Gray, Nat. Arr. Brit. Pl. **1**: 455. 1821, non Schreber, 1791.

The selection of a type species of this very large and variable genus is very difficult. When originally proposed, it included most of the foliose members of the lecanorine series. Each successive treatment by Acharius removed sections and species to other genera. Of the original species surviving in his last treatment of the genus in 1814, most remain in the genus as it is commonly understood today. If we exclude the doubtful species and the species subsequently taken as types of other genera or closely related to them, e. g., *Omphalodium* Meyen & Flotow, Nova Acta Acad. Leopold. Carolin. **19**: Suppl. 223. 1843, based on *O. pisacomense* Meyen & Flotow, includes *O. hottentotta* (Ach.) Meyen & Flotow; *Parmotrema* Massalongo, Atti. I.R.Ist. Veneto III. **5**: 248. 1860, based on *P. perforata* (Wulfen apud Jacquin) Mass. and including *Parmelia perlata* (Hoffm.) Ach. and *P. caperata* (L.) Ach.; *Pseudoevernia* Zopf, Beih. z. bot. Centralbl. **16**: 124. 1903, based on *P. furfuracea* (L.) Zopf; sect. *Melaenoparmelia* Hue, Nouv. Arch. Mus. IV. **1**: 138. 1899, based on *P. stygia* (L.) Ach. and including *P. olivacea* (L.) Ach.; *Xanthoparmelia* Vainio, Étude Lich. Brésil **1**: 60. 1890, based on *P. conspersa* Ach., etc., and including *P. centrifuga* (L.) Ach., we are left with two groups of four species each. The subgenus *Hypogymnia* includes one group: *P. encausta* (Sm.) Ach., *P. intestiniformis* (Vill.) Ach., *P. lophyrea* Ach., and *P. physodes* (L.) Ach. The remaining four species—*P. omphalodes* (L.) Ach., *P. saxatilis* (L.) Ach., *P.*

scortea Ach., and *P. tiliacea* Ach.—are commonly placed in *Euparmelia* sect. *Hypotrachynae*. A species selected from the latter group would conserve the name for the larger number of species.

We have been unable to consult the original publication cited for *Imbricaria*. Acharius used it as a subgenus in 1798 and abandoned it in all his subsequent treatments. For *Imbricaria* Michaux cites only *I. convexiuscula (Anzia colpodes* (Ach.) Stiznbgr. fide Zahlbr., Cat. Lich. Univ. **6**: 276. 1931), although *I. omphalodes* and *I. physodes* are mentioned without description. Lamarck & DeCandolle used it in the modern sense of *Parmelia,* but included some species of Collemaceae and Usneaceae.

Physcia S. F. Gray was based on *P. physodes* (L.) Gray, now placed in *Parmelia* sect. *Hypogymnia,* and *P. diatrypa* (Ach.) Gray, later made the type species of *Menegazzia.*

Thallus foliose, laciniate, lobes rounded, elongate, linear or filiform, appressed or ascending with more or less well-developed rhizinae, the lower surface rarely nude; upper cortex of simple or branched septate hyphae perpendicular to the surface, with small cells, upper surface often isidiose or sorediose; algae protococcoid; medulla loosely woven, occasionally with a central cavity, composed of thin or thick-walled periclinal hyphae; lower cortex usually dark. Apothecia sessile or short-stipitate on the upper surface, disc sometimes perforate; amphithecium well developed; epithecium amorphous; hypothecium hyaline with algae below; paraphyses imbedded in a gel, usually branched and septate; asci 2–8-spored; ascospores hyaline, unicellular, ellipsoidal, ovoid or spherical, thin-walled or with a thickened membrane. Spermogonia immersed in the surface of the thallus or in the amphithecium or ostiole protruding from a wart, spherical to ovoid, wall black above, brown or hyaline below; spermatiophores simple or sparingly branched, spermatia cylindric to fusiform.

The genus may be divided as follows:

Cortex appearing pseudoparenchymatous above and often extending the underside of the lobes for a short distance; lower cortex of compact slender, periclinal hyphae, or decomposed............................*Physcioideae*

Cortex of branched hyphae perpendicular to the surface of the thallus; cells more or less isodiametric, often giving the appearance of pseudoparenchyma on both upper and lower surfaces.
  Nude below, without rhizinae.
    Thallus perforate below; laciniae slender; apothecia 6–8-spored; ascospores not over 10 μ.
      Medulla excavated.......................................*Hypogymnia*
      Medulla solid.......................................*Allantoparmelia*
    Thallus perforate above; asci 2–4-spored; ascospores relatively large...*Menegazzia*
  Rhizinae scanty; laciniae greenish brown to black; apothecia sessile...*Melaenoparmelia*
  Thallus with long coarse rhizinae to almost nude; laciniae slender, usually ascending, gray.......................................*Pseudoevernia*
  Central portion of thallus rhizinose, margin nude, smooth but often ciliate; laciniae white, gray or yellowish; apothecia more or less stipitate...*Parmotrema*
    Thallus yellow.......................................*Subflavescentes*
    Thallus white or gray.......................................*Subglaucescentes*
  Thallus completely and densely rhizinose below; rhizinae next the margin often reduced to papillae; laciniae appressed..................*Euparmelia*
    Laciniae yellow.......................................*Xanthoparmelia*
    Laciniae white to gray or brownish..........................*Hypotrachynae*
      Laciniae di- or seldom trichotomously branched, slender, almost linear, tips truncate or notched..............................*Sublinearis*
      Laciniae irregularly branched, lobes of unequal width.
        Tips usually rounded, or notched; apothecia sessile...........*Cyclocheila*
        Tips usually more or less ascending; apothecia short-stipitate...*Irregularis*

Several of the above subdivisions have already been segregated as genera but in the absence of a monographic treatment of the whole group the generic segregates have not been widely recognized.

The systematic position of much Antarctic material referred here is doubtful since much of the material is sterile. In view of the structure of the cortex, *Cornicularia lanata* v. *minuscula* Hue, excl. syn. is much better left in *Alectoria* or *Cornicularia* rather than referred to *Parmelia.*

The determination of *Parmelia saxatilis* (L.) Ach. from the Antarctic is extremely doubtful since the material is sterile and no microscopic details of the Antarctic plants are given. *P. quarta* Darb. belongs in *Omphalodium* (see p. 561) rather than in the section *Hypotrachynae* as catalogued by Zahlbruckner. *P. Gerlachei* Zahlbr. (*P. antarctica* Vainio non Bitter) belongs in the section *Xanthoparmelia. P. acervata* Hue seems more closely related to our species from Marie Byrd Land and is rather aberrant in its cortical structure from either the *Hypotrachynae* where it was placed by its author or the section *Melaenoparmelia* where it is catalogued by Zahlbruckner. Our species approach *Physcia* in the structure of the thallus and would be placed in that genus in the absence of apothecia. Since all the species of *Physcia* so far reported from the Antarctic have been small sterile thalli, it is quite possible that some of them may be found to belong in *Parmelia* when apothecia are found. We have preferred not to transfer them to *Parmelia* but have included members of both genera in the key on p. 584, based largely upon characters observable in the sterile thallus. Two of our own species are sterile but we have preferred to refer them to *Parmelia* in view of their similarity to the structure of our fertile species, recognizing that it may be necessary to transfer them to *Physcia,* should their apothecial characters when discovered, warrant such a transfer.

PARMELIA **leucoblephara** Dodge & Baker, sp. nov.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-7.*

Thallus ad 0.8 cm. diametro, laciniae irregulariter ramosae, divaricatae, applanatae subconvexaeve, 0.2–0.3 mm. latitudine apicibus subtruncatis, laeves, albidae, marginibus laevibus cum ciliis longis, ramosis, albis dein fuscis; sorediis granulosis subisidiosisque, marginibus subelevatis; KOH flavescens; rhizinae elongatae, fuscae, non ramosae; cortex superior 15 μ crassitudine, fastigiatus, cellulis ellipsoideis, brunneis, 7–14 × 5.5–7 μ, strato gelifacto 7–8 μ crassitudine tectus; stratum gonidiale 20–30 μ crassitudine, cellulis protococcoideis, 5–7 μ diametro, singulis vel in coloniis parvis; medulla 55–60 μ crassitudine, hyphis tenuibus 1.5–2 μ diametro, laxissime implexis; cortex inferior 30 μ crassitudine, hyphis 1.5–2 μ, subbrunneis, laxe implexis, strato extero cellularum subsphericarum, 5.5–6 μ, brunnearum; rhizinae 40–60 μ diametro, hyphis longitudinalibus, strato extero brunneo.

Spermogonia immersa, subspherica, 55–70 μ, murus 7–9 μ crassitudine, cellulis pachydermaticis isodiametricis; spermatiophorae elongatae, tenues; spermatia bacilliformia, recta.

Thallus up to 0.8 cm. in diameter, laciniae irregularly branched, divaricate, flat or somewhat convex, white, smooth, margins smooth, with long branched cilia, white then fuscous; soredia granulose and subisidiose with somewhat elevated margins; KOH yellowing; rhizinae long, fuscous and unbranched; upper cortex 15 μ thick, fastigiate, cells ellipsoid, brown, 7–14 × 5.5–7 μ, covered by a gelified layer 7–8 μ thick; algal layer 20–30 μ thick, cells protococcoid, 5–7 μ in diameter, single or in small colonies; medulla 55–60 μ thick, of slender hyphae 1.5–2 μ in diameter, very loosely woven; lower cortex 30 μ thick, of brownish hyphae 1.5–2 μ, loosely woven with an outer layer of subspherical brown cells 5.5–6 μ in diameter; rhizinae 40–60 μ in diameter, of longitudinal hyphae with an outer brown layer.

Spermogonia immersed, subspherical, 55 × 70 μ, wall 7–9 μ thick, of isodiametric thick-walled cells; spermatiophores long, slender; spermatia bacilliform, straight.

Growing loose over mosses, *Grimmia Antarctici,* over granodiorite and biotite-sericite and sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1, 73-7,* type; Chester Mts., *P. Siple & S. Corey 97A-1;* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-4.*

PARMELIA **variolosa** Dodge & Baker, sp. nov.

Pl. 50, figs. 192–201.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1.*

Thallus ad 2 cm. diametro, laciniae convexae, 0.6–0.8 mm. latitudine, dichotome ramosae, apicibus truncatis, laeves, pruinosae, primulino-flavae raro sordidescentes; soralia magna, granulosa, KOH addito flavescentia; cortex superior 5–20 μ crassitudine, cellulis isodiametricis laxe dispositis, strato cellularum emortuarum 5–15 μ crassitudine tectus; algae 7–9 μ diametro, protococcoideae, paucae, sparsae; medulla 500–600 μ crassitudine, hyphis 2–4 μ diametro, laxe reticulatimque dispositis; cortex inferior 40–60 μ crassitudine, hyphis obscuris pachydermaticis; rhizinae ad 1100 μ diametro, hyphis obscuris longitudinalibus, exteris pachydermaticis.

Apothecia ad 0.5 mm. diametro, marginata, rufo-brunnea aut grisea, sessilia, rara; amphithecium 50–80 μ crassitudine, cortex 20 μ, decompositus, raro subfastigiatus; parathecium non evolutum; hypothecium 10–20 μ crassitudine, hyalinum, hyphis tenuibus dense reticulatis; thecium 50–60 μ altitudine; paraphyses 1 μ diametro, apicibus subinflatis vaginatis, ad 3.5 μ diametro, recti, hyalini; asci 50–63 × 10–15 μ, elongato-clavati, vaginati; ascosporae octonae, 9–11 × 4.5–6 μ, late ellipsoideae vel subreniformae, hyalinae.

Spermogonia 70 × 90 μ, ampulliformia, murus obscure brunneus, cellulis isodiametricis parvis pachydermaticis; spermatia 1–1.5 μ longitudine, recta, tenuia.

Thallus up to 2 cm. in diameter, laciniae convex, 0.6–0.8 mm. broad, dichotomously branched, tips truncate, smooth, pruinose, primuline yellow rarely graying; soralia large, granular, KOH yellow; upper cortex 5–20 μ thick, rather loosely pseudoparenchymatous, covered by a gelified layer 5–15 μ thick, thicker where the cortex is thin and vice versa; algae 7–9 μ in diameter, protococcoid, few, small, scattered in the upper portion of the medulla which is 500–600 μ thick, of loosely reticulate hyphae 2–4 μ in diameter; lower cortex 40–60 μ thick, of very dark, sometimes black, hyphae, more or less fibrous in arrangement with here and there abundant groups of cut ends of hyphae running at right angles to the others; rhizinae common, up to 1100 μ in diameter, of dark fibrous hyphae with an outer layer identical and continuous with that of the thallus, about 10 μ thick. The tips of the lobes have a cortex thicker than the upper one, about 30–40 μ thick.

Apothecia up to 0.5 mm. in diameter, more or less circular, with a prominent margin, reddish brown to gray and concolorous with the thallus, sessile, very rare; amphithecium 50–80 μ thick, cortex about 20 μ, mostly decomposed, occasionally somewhat fastigiate; parathecium not developed; hypothecium 10–20 μ thick, hyaline, of slender densely reticulate hyphae; thecium 50–60 μ tall; paraphyses about 1 μ in diameter, with slightly enlarged apical cells surrounded by a gelified sheath 3.5 μ in diameter, mostly straight, rarely branched, not darkened; epithecium 5–10 μ thick, light brownish; asci 50–63 × 10–15 μ, elongate-clavate, with a prominent sheath and an umbonate end to the protoplasmic content, 8-spored; ascospores 9–11 × 4.5–6 μ, broadly ellipsoidal to somewhat reniform, hyaline.

Spermogonia frequent, 70 × 90 μ, flask-shaped, with a dark brown wall of thick-walled, small, isodiametric cells; spermatia 1–1.5 μ long, very slender and straight.

On dark greenish gray slate and growing over mosses, *Grimmia Antarctici.*

The apothecia are extremely rare, and it is difficult to establish their identity with the thallus. Apparently in the apothecial regions the thallus enlarges, becomes distorted, and more floccose with an increased algal content (pl. 50, fig. 198).

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1*, type; Lichen Peak, *P. Siple & S. Corey 73-1, 73-4;* Skua Gull Peak, *P. Siple & S. Corey 72W-3, 72W-4, 72W-6, 72W-14, 72W-15.*

PARMELIA **Coreyi** Dodge & Baker, sp. nov.

Pl. 50, figs. 202–204.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-3.*

Thallus fragilis, laciniatus, lobis convexis, 0.4–0.5 mm. latitudine, apicibus flabellatis, 0.8–1.0 mm. latitudine, excisis, apicibus lacinularum rotundatis, laevis, pruinosus, raro erosus granulosusque, griseus obscurascensque, KOH addito flavescens; cortex superior 10–20 μ, fastigiatus, cellulis ellipsoideis, 5.5–7 × 4–5 μ, compactioribus quam in *P. variolosa*, exteris obscuris, strato gelifacto 7–10 μ crassitudine tectus; stratum gonidiale 30–35 μ crassitudine, cellulis ad 10 μ diametro, protococcoideis; medulla 700–1000 μ crassitudine, hyphis subbrunneis laxe implexis; cortex inferior 20–30 μ crassitudine, fibrosus, laxior quam in *P. variolosa;* rhizinae 700–1000 μ diametro, ramosae, hyphis densissime compactis longitudinalibus, cortex ad 10 μ crassitudine, cellulis brevibus pachydermaticis obscuris.

Apothecia ad 0.5 mm. diametro, marginata, rara, brunnea, sessilia; hypothecium hyalinum; thecium 45–55 μ altitudine; paraphyses 1–1.5 μ diametro, septati, apicibus subinflatis, vaginatis ad 3.5 μ diametro, brunneis, epithecium 5–10 μ crassitudine, brunneum, gelifactum; asci 42–50 × 10.5–13 μ, late clavati, apice protoplasmatis umbonata, vaginati; ascosporae octonae, 10.5–14.5 × 3.5–4.5 μ, elongato-ellipsoideae aut subreniformes, hyalinae.

Spermogonia 55 × 70 μ, subspherica, murus hyalinus, spermatiophorae crassiores, septatae.

Thallus fragile, laciniae convex, 0.4–0.5 mm. broad, tips flabellate, 0.8–1.0 mm. broad, sinuses excised, tips of lacinulae rounded, smooth, pruinose, rarely eroded, granulose, gray and darkening, KOH yellow; upper cortex 10–20 μ thick, fastigiate, of ellipsoidal cells 5.5–7 × 4–5 μ, loosely packed but much more closely than in *P. variolosa,* upper cells darkened, covered by a gelified layer 7–10 μ thick; algal layer 30–35 μ thick, cells up to 10 μ in diameter, protococcoid, quite abundant; medulla 700–1000 μ thick, of loosely woven hyphae somewhat brownish throughout; lower cortex 20–30 μ, less compact than in *P. variolosa,* only the outer cells darkened, more or less fibrous; rhizinae numerous, 700–1000 μ in diameter, branched, dark brown on the outside, cortex up to 10 μ thick, of dark short thick-walled cells, the rest of densely packed longitudinal hyphae.

Apothecia up to 0.5 mm. in diameter, rarely with a prominent margin, brown, sessile; hypothecium hyaline; thecium 45–55 μ tall; paraphyses 1–1.5 μ in diameter, rarely branched, septate, the terminal cells enlarged, surrounded by a large gelified sheath up to 3.5 μ in diameter, brown at maturity, epithecium 5–10 μ thick, brownish, gelified; asci 42–50 × 10.5–13 μ, broadly clavate, protoplasmic contents with a small umbonate apex, sheath moderately developed, 8-spored; ascospores 10.5–14.5 × 3.5–4.5 μ, elongate-ellipsoidal to subreniform, hyaline.

Spermogonia about 55 × 70 μ, subspherical, the walls not darkened, imbedded in the thallus, spermatiophores thick, closely septate.

Growing over mosses on sandy loam.

Due to the rarity of the apothecia, they were not imbedded and sectioned in this species. All microscopic details are from crushed mounts.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-1;* Skua Gull Peak, *P. Siple & S. Corey 72W-2, 72W-3,* type, *72W-4, 72W-7, 72W-9, 72W-13, 72W-14.*

PARMELIA **griseola** Dodge & Baker, sp. nov.

Pl. 50, figs. 205–208.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-3.*

Thallus ad 1 cm. diametro, laciniae lineares, convexae, dichotome ramosae, 0.2–0.3 mm. latitudine, pruinosae erosaeque, pallide olivaceo-alutaceae dein griseae obscurascentesque, KOH addito rufescentes; cortex superior 20–40 μ crassitudine, pseudoparenchymaticus, cellulis circa 4 μ diametro, leptodermaticis, strato gelifacto 5–10 μ crassitudine tectus; stratum gonidiale 30–50 μ crassitudine, cellulis protococcoideis, ad 10 μ diametro; medulla 50–80 μ crassitudine, hyphis 2 μ diametro, laxe implexis, densioribus ad corticem inferiorem; cortex inferior 20–30 μ crassitudine, fibrosus, cellulis 1–3 μ diametro, exteris obscurascentibus; rhizinae ramosae, 500–800 μ diametro, cellulis 1.5–2 × 20 μ, cortex 5 μ crassitudine, cellulis 2–4 × 4.5–9 μ. Sterilis.

Thallus up to 1 cm. in diameter, laciniae linear, convex, dichotomously branched, 0.2–0.3 mm. broad, pruinose and eroded, pale olive buff then graying and darkening, KOH rufescent; upper cortex 20–40 μ thick, pseudoparenchymatous, in some places the outer cells darkened, in others not, of thin-walled cells about 4 μ in diameter, covered by a gelified layer

5–10 μ thick over the darkened areas, less developed over the lighter areas; algal layer up to 30–50 μ thick, cells up to 10 μ in diameter, protococcoid, abundant, some imbedded in the cortex; medulla 50–80 μ thick, of slender hyphae about 2 μ in diameter, loosely woven, becoming more or less fibrous at the junction with the lower cortex which is 20–30 μ thick, fibrous, hyphae 1–3 μ in diameter, only the outer ones darkened; rhizinae frequent, branched, 500–800 μ in diameter, of dark cells 1.5–2 × 20 μ, longitudinally arranged, covered by a cortex about 5 μ thick of short, thick-walled dark cells 2–4 × 4.5–9 μ, progressively longer and thinner within. Sterile.

On dark greenish gray slate and growing over mosses on sandy loam.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-3,* type, *72W-9, 72W-15.*

USNEACEAE

Thallus fruticose, erect, prostrate or pendent, attached to the substrate by a hapteron, radiate, corticate, with longitudinal hyphae (in *Alectoria)* or more usually a palisade of pseudoparenchyma; algae *Protococcus;* medulla dense and horny to cartilaginous or arachnoid, of longitudinal hyphae. Apothecia circular, plane or saucer-shaped, sessile or stalked; amphithecium well developed; asci 1–8-spored; ascospores hyaline or rarely brown, unicellular to muriform, thin-walled.

KEY TO ANTARCTIC GENERA

Cortex strengthened by strands of mechanical tissue; medulla arachnoid; spores 2-celled .... *Ramalina*
Medulla uniform, arachnoid or horny-cartilaginous.
  Cortex of longitudinal hyphae; thallus hollow .... *Alectoria*
  Cortex a palisade of pseudoparenchyma, chondroid axis well developed and central.
    Thallus low, podetiiform to coralloid .... *Siphula*
    Thallus fruticose, radial in structure; medulla easily separable from the cortex .... *Usnea*

Only *Alectoria* and *Usnea* sect. *Neuropogon* have been found in our region; the other genera are represented by one or two species each in the Antarctic Archipelago.

ALECTORIA

ALECTORIA Acharius, Lichenogr. Univ. 120. 1810.

The type species was not designated. Since all the species of Acharius' treatment have been reduced or transferred elsewhere, except *A. jubata* (L.) Ach. and *A. sarmentosa* Ach., and since the former was taken as the type of *Bryopogon* Link, which is often considered a separate genus, Clements & Shear (Gen. Fung. 322. 1931) chose as a type *A. sarmentosa* Ach. as it belongs in the section *Eualectoria* Th. Fries.

Thallus pendulous, prostrate or somewhat erect, attached by a hapteron, round or somewhat flattened, seldom angular, radiate, often black; cortex horny, of longitudinal gelified hyphae; algae *Protococcus*; medulla of longitudinal hyphae, center usually hollow or arachnoid; pseudocyphellae or soralia frequent. Apothecia lateral on short branches; amphithecium usually well developed, margin naked or ciliate, sessile or almost stalked, saucer-shaped, absent in our species; disc brown to black; hypothecium hyaline, resting on the algal layer; paraphyses branched and anastomosing; asci 4–8-spored; ascospores unicellular, ellipsoid, hyaline or brown, thin-walled. Spermogonia immersed in small warts, spermatiophores little-branched, septate; spermatia short, straight, somewhat thickened at each end.

The genus is usually divided into two sections sometimes recognized as genera: *Bryopogon,* thallus bright or dark, medulla hollow in the center, asci 8-spored, ascospores hyaline; and *Eualectoria,* thallus not black, medulla arachnoid, asci 4-spored, spores brown. While the species so far reported from Antarctica are sterile, they seem to belong in section *Bryopogon* as does our single fertile species.

Since *A. antarctica* is unique in the family in lacking an amphithecium, it might be considered the type of a new genus and family in the lecideine series of families, representing a higher state of development from the Phyllopsoraceae. In all of its other characters it agrees with *Alectoria* sect. *Bryopopogon,* and we prefer to leave it in this genus as is done in case of the few species of *Stereocaulon* of the section *Lecanocaulon* with lecanorine apothecia in an otherwise lecideine family.

KEY TO ANTARCTIC SPECIES

Thallus pale rufous, base fuscous, erect, flattened, variously long-perforate, granulose-sorediate; ecorticate; algae 10–20 (–28) μ............*A. corymbosa*

Thallus black, prostrate, terete, not perforate; corticate, esorediose; algae 6–18 μ.

  Branches erect or incurved, ramuli spinulose, surface smooth or nodulose; cortex 10–20(–30) μ; hyphae 8–18 μ..........................*A. nigerrima*

  Branches dichotomous or variously divaricate and intricate.

    Ramuli capilliform, fibrillose; cortex 20–40 μ; hyphae 10–12 μ.....*A. intricata*

    Ramuli obtuse or acute but never capilliform; cortex 10–15 μ.....*A. antarctica*

    Tips short-digitate; cortical hyphae 4–6 μ.......................*A. minuscula*

ALECTORIA **antarctica** Dodge & Baker, sp. nov.

Pl. 51, figs. 209–216.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1*

Thallus radiatus, ramosissimus, dichotomus, apicibus obtusis subacutisve, non attenuatis, niger; cortex 10–15 μ crassitudine, irregularis, hyphis longitudinalibus pachydermaticis, exteris nigris, interis hyalinis, 3–5 μ diametro; algae ad 8 μ diametro, protococcoideae, rarae, sparsae; medulla 100–200 μ diametro, centro aperto, sine axi chondroideo, hyphis 2 μ diametro, longitudinaliter aut irregulariter implexis.

Apothecia ad 0.7 × 0.45 mm., sessilia, nigra, convexa, carbonacea; amphithecium deest; parathecium 20–25 μ crassitudine, obscure fuscum, pseudoparenchymaticum; hypothecium hyalinum vel dilute brunneum; thecium 35–40 μ altitudine; paraphyses 1 μ diametro, pauci, septati, non capitati, ramosi vel non, hyalini; epithecium 10–15 μ, hyalinum, KOH–; asci 32–36 × 13–15 μ, late clavati, vaginati; ascosporae octonae, 6–7 × 3–3.5 μ, ellipsoideae, hyalinae.

Thallus radiate, much branched, dichotomous, the ends blunt to pointed but never extremely attenuated, entirely black; cortex 10–15 μ thick, irregular, of longitudinal hyphae appearing pseudoparenchymatous in cross-section, thick-walled, outside black becoming progressively lighter toward the center, 3–5 μ in diameter; algae up to 8 μ in diameter, protococcoid, few, scattered; medulla 100–200 μ in diameter, the center open and lacking a chondroid axis, of irregularly woven hyphae about 2 μ in diameter, mostly longitudinal, sometimes amorphous.

Apothecia up to 0.7 × 0.45 mm., black, sessile, convex, carbonaceous; amphithecium lacking; parathecium 20–25 μ thick, dark fuscous, pseudoparenchymatous, merging laterally with the thalline cortex; hypothecium hyaline to pale brownish; thecium 35–40 μ tall; paraphyses about 1 μ in diameter, very few, septate, branched or unbranched, heads scarcely expanded, not darkened; epithecium 10–15 μ, hyaline, KOH–; asci 8-spored, 32–36 × 13–15 μ, broadly clavate, with a prominent gelified sheath; ascospores 6–7.5 × 3–3.5 μ, ellipsoidal, hyaline.

On coarse-grained leucogranite, granodiorite, pink granite, deep olive-buff granite, sandy loam, biotite-sericite-orthoclase schist, and fine-grained dike.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-2, HW-6, HW-9, HW-10, HW-13, HW-14.*

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1,* type, *R-4, R-7;* Mt. Grace McKinley, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff McK-5, McK-6, McK-10;* Mt. Corey, *P. Siple & S. Corey 112E-2;* Haines Mts., *P. Siple & F. A. Wade H-2;* Lichen Peak, *P. Siple & S. Corey 73-1, 73-2, 73-6;* Skua Gull Peak, *P. Siple & S. Corey 72W-11, 72W-12, 72W-13, 72W-14;* Chester Mts., *P. Siple & S. Corey 97A-1;* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-5;* Mt. Stancliff, *P. Siple & S. Corey 72A-1.*

S. VICTORIA LAND: Queen Maud Mts., Durham Point at northeast portal of Thorne Glacier, *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-5.*

USNEA

USNEA Wiggers, Primit. Fl. Holsat. 90. 1780.

The type species is *Usnea florida* (L.) Wigg.

Thallus fruticose or filamentous, very rarely of a single branch, usually of several compound branches, dichotomous or subdichotomous, more rarely sympodially branched, from 1 cm. to 7 m. or more long, erect, pendulous or prostrate, base attached to the substrate; branches thicker at the base, thinning very much toward the apex, 0.2–7 mm. thick, terete, angled or longitudinally sulcate, foveolate and scrobiculate, smooth or tuberculate, verrucose or spinuliferous, continuous, areolate or annulate; cortex coriaceous or somewhat spongy, of densely woven, thick-walled, conglutinate hyphae, in a few species almost evanescent on the primary branches; algae *Protococcus;* medulla distinct although often thin, of thin-walled hyphae, very rarely with scattered colonies of algae; chondroid axis single, percurrent, of longitudinal thick-walled hyphae usually very solid, rarely lacerate with a loosely woven center.

Apothecia lecanorine, constricted at the base, lateral, rarely subterminal or terminal, margin evanescent or indistinct, nude or ciliate; asci subcylindric or slightly inflated; spores typically 8 per ascus, simple, hyaline, ellipsoidal, epispore distinct; paraphyses conglutinate, septate, branched, epithecium with distinct granules. Spermogonia rarely present, pale or slightly darkened, immersed in tubercles; spermatia straight with one end slightly thicker.

The genus is divided into six subgenera of which only *Neuropogon,* sometimes recognized as a genus, is typically Antarctic. All its species are confined to the Southern Hemisphere except *U. sulphurea,* which ranges from Patagonia northward in elevations above 3000 m. in the American tropics to the Arctic.

NEUROPOGON

NEUROPOGON Nees & Flotow, Linnaea **9**: 496. 1835, pr. p.

Usnea sect. *Neuropogon* Mont. ap. Gay, Hist. Fis. Polit. Chile, Bot. **8**: 67. 1852, pr. p.

Usnea subgenus *Neuropogon* Motyka, Lich. Gen. Usnea Stud. Monogr. Syst. **1**: 18. 1936.

Thallus short, not reaching 10 cm., fruticose, erect, branched, almost wholly saxicolous, sulphur yellow, orange, or orange red, tips and cilia of apothecia commonly black or whole thallus black or black variegated. Apothecia terminal or lateral, eciliate or rarely ciliate.

KEY TO ANTARCTIC SPECIES

Thallus sorediate, usually sterile.
  Soralia eroded, not in tubercles; thallus usually smooth except for soredia.. .... *U. antarctica*
  Soralia in tubercles, not conspicuously eroded.
    Thallus foveolate to rugose.......... *U. frigida*
    Thallus papillate.......... *U. granulifera*
Thallus not sorediate, usually fertile, grossly tuberculate-papillate.
  Thallus almost eciliate, tips rather thick, usually fasciate; medulla fairly dense, KOH almost negative, axis horny or chondroid and subpellucid, then slightly fuscous and glassy.......... *U. fasciata*
  Thallus tips frequently divaricate-branched and appearing ciliate, slender; medulla thin, rather loose, axis opaque, white but not horny..... *U. strigulosa*

Usnea antarctica DuRietz, Svensk Bot. Tidskr. **20**: 90, 93. 1926. Pl. 51, figs. 217–222.

Neuropogon Taylori Blackman, Rept. Coll. Nat. Hist. Antarctic Voy. Southern Cross 1898–1900. 320. 1902, non Hook. f. & Taylor, London Jour. Bot. **3**: 657. 1844.

Usnea sulphurea f. *sphacelata* Th. Fr., Nyt Mag. Naturvidensk. **40**: 208. 1902, non *Usnea sphacelata* R. Brown, Capt. Parry's Voy. Nat. Hist. Suppl. Append. cccvii. 1824.

Neuropogon melaxanthum Darbishire, Nat. Antarct. [Discovery] Exp. Nat. Hist. **5**: 7. 1910; Brit. Antarct. [Terra Nova] Exp. Bot. 58. 1923, excl. syn.

Type: South Victoria Land, Geikie Land, 71° 40′ S., 170° E., Admiralty Range, 700 m., *C. E. Borchgrevink*, in Bot. Mus. Univ. Upsala.

Thallus erect or prostrate, fruticose, 3–5 cm. tall, sparingly branched, eramulose, rigid, servediose, straw-color, yellowing, tips black or with black bands, or completely blackened, smooth or somewhat shining; base thick, up to 1.5 mm., rigid and firm, sparsely sympodially or dichotomously branched above, branches slightly attenuate at the base and subulate-attenuate at the tips, usually almost simple or branched below the tips, terete, glabrous, shining, smooth or very indistinctly papillate above, sometimes subfoveolate, lateral branches rare, somewhat constricted at the base, ascending, appressed; cortex thin, about 60 μ thick, almost horny, yellow without, of fastigiate pseudoparenchyma, cells thin-walled, up to 7 μ in diameter; algae protococcoid, cells up to 8 μ in diameter, scattered in the medulla which is thin, 80–100 μ, dense, white, KOH–, of smooth hyphae 1.5–3.5 μ in diameter, branched and anastomosed, irregularly woven in a close network, denser next the cortex, looser next the medulla; chondroid axis about 450 μ, horny, slightly fuscous, of closely packed, longitudinal hyphae 1 μ in diameter, thin-walled, cells 25–30 μ long.

Sterile. Soredia frequent in the upper portions, granulose-farinose, white or finally blackened, soralia deeply eroded, or at least not in tubercles.

Growing on granodiorite, sericite schist, and pink granite.

Reference: *Biol. Bull.*, **141**: 592–601. (December, 1971)

SUBSTRUCTURE OF THE CORTICAL SINGLET MICROTUBULES IN SPERMATOZOA OF *MACROSTOMUM* (PLATYHELMINTHES, TURBELLARIA) AS REVEALED BY NEGATIVE STAINING[1]

MARY BETH THOMAS[2] AND CATHERINE HENLEY

Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514

The cortical singlet microtubules of the spermatozoa of certain flatworms have been circumstantially implicated in motility. The motile spermatozoa of *Plagiostomum* have cortical singlet microtubules and no axonemes (Christensen, 1961), and the bodies of the spermatozoa of *Dugesia* and *Bdelloura* (Silveira and Porter, 1965) and *Mesostoma* (Henley, Costello, Thomas and Newton, 1969) contain singlet microtubules and undulate independently of the two free flagella.

Following negative staining, the cortical singlets of the spermatozoa of some species of flatworms, namely the lungfluke *Haematoloechus* (Burton, 1966a, 1966b, 1970) and the polyclads *Stylochus* (Thomas, 1970) and *Notoplana* (Henley, in press), have a helical wall structure. There have been observed in these forms transitions to a protofibrillar configuration, which is the more typical configuration of the subunits in some negatively stained singlets (Gall, 1966), doublets (André and Thiéry, 1963; Grimstone and Klug, 1966; Pease, 1963) and triplets (Wolfe, 1970).

Because of the molecular dimorphism of the microtubules and their probable function in the motile process, cortical singlet microtubules are of interest as a model system for microtubule-associated motility. Therefore, knowledge of the size, number, and arrangement of the subunits making up the walls of the microtubules is important to understanding their function.

The number of subunits which occurs around the circumference of microtubules has been established for some species (for a review, see Arnott and Smith, 1969), but this is not the case for the cortical singlets of spermatozoa of the flatworms. From the results of rotational analysis, Burton (1966a) has suggested that there are 8 subunits around the circumference of the cortical singlet microtubules of the spermatozoa of *Haematoloechus*. Negative staining reveals the presence of 6 or 7 protofibrils for the cortical singlets of the spermatozoa of *Stylochus* (Thomas, 1970). However, the number of protofibrils seen in negatively stained preparations probably represents only a portion of the entire complex in most cases. This may be due to maceration of some of the microtubules (see Henley, 1970) or to superimposition of one half of the protofibrils on the other half (Burton, 1966b).

---

[1] Aided by a grant from the National Institutes of Health, GM 15311, to Drs. Donald P. Costello and Catherine Henley. We acknowledge with thanks the valuable advice of Dr. Costello.

[2] Present address: Department of Biology, Wake Forest University, Winston-Salem, North Carolina 27109.

The motile spermatozoon of *Macrostomum* contains cortical singlet microtubules and there are no free or incorporated axonemes (Fig. 1). Negative staining reveals that, typically, the subunits of the cortical singlets are helically arranged, and sometimes undergo a transition to the protofibrillar configuration; this latter configuration was found to terminate in at least 12 protofibrils for a number of singlet microtubules.

Materials and Methods

Specimens of *Macrostomum* sp. were collected from still water below the dam of University Lake near Chapel Hill, North Carolina. Whole animals were placed in a Columbia watchglass containing 1% aqueous phosphotungstic acid (PTA), pH 6.8. The animals were teased with steel needles, and drops of the PTA, containing spermatozoa freed from the animal, were transferred to Formvar-carbon-coated 200-mesh copper grids. After approximately 6 minutes, the fluid was drained from the grids which were then allowed to dry; preparations were examined with the Zeiss 9A electron microscope.

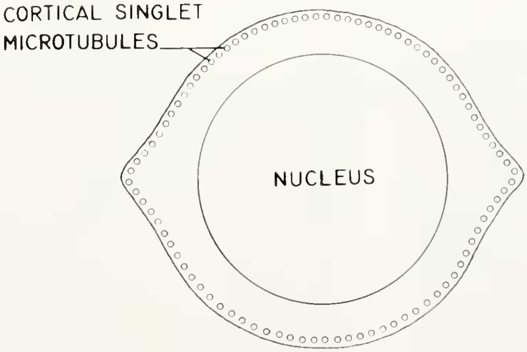
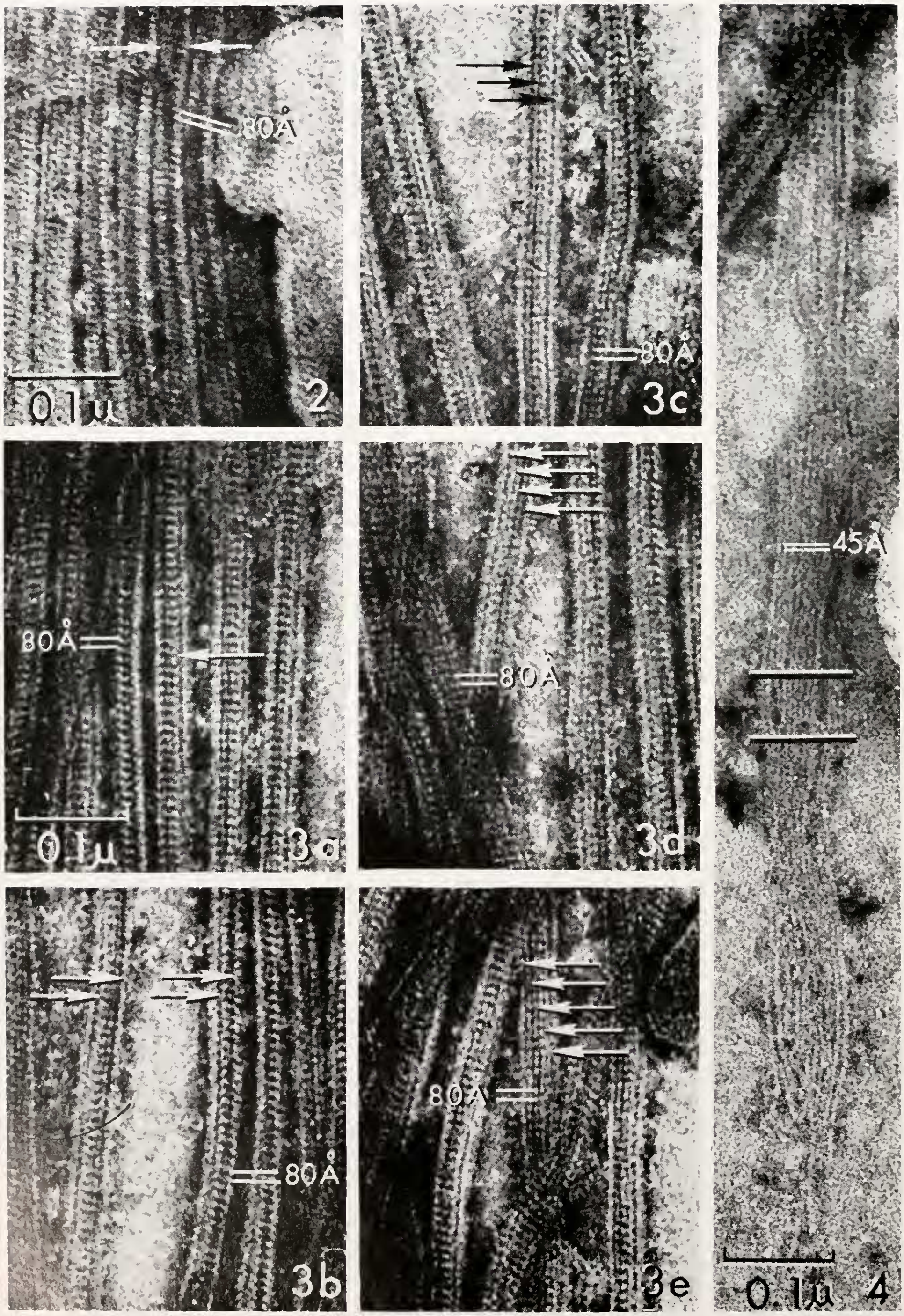


Figure 1. Diagram of the arrangement of cortical singlet microtubules in the nuclear region of a spermatozoon of *Macrostomum*. No axonemes are present.

Results

In sectioned spermatozoa of *Macrostomum*, there are *ca.* 60–80 cortical singlet microtubules; 30–40 were present in material negatively stained with PTA (the remainder presumably having been digested away or lost spatially from the total complement during the process of negative staining). Three arrangements of the subunits in these PTA-treated microtubules were found. (1) In a few regions, the subunits were in the intact helical configuration (Fig. 2), comparable to that described for cortical singlet microtubules in spermatozoa of other flatworms. (2) There were large areas in which the lateral spacing of the subunits was increased, but the circumferential integrity of the tubules appeared to be preserved in such a way that only the top halves of the microtubules could be seen (Fig. 3a-e). (3) At their termini, these microtubules ended in protofibrils lying in one plane (Fig. 4).


80Å
0.1µ
2
80Å
3c
80Å
0.1µ
3a
80Å
3d
80Å
3b
80Å
3e
45Å
0.1µ
4

Figures 2–4.

(1) The width of the microtubules having the subunits arranged in the most compact helical configuration (Fig. 2) is *ca.* 200–210 Å; the alternating electron-lucent and electron-dense bands have a center-to-center spacing of *ca.* 80–85 Å and are inclined at an apparent angle of *ca.* 12–14°. The subunits appear to be closely apposed along the helical path, for there is no line of demarcation between adjacent subunits. Accumulation of the electron-dense PTA along the central axis suggests the presence of a lumen, indicating that the microtubule is cylindrical or only slightly flattened. Measurement of the cortical singlets in sectioned material likewise indicates a diameter of *ca.* 200 Å.

(2) Varying degrees of lateral separation of adjacent subunits occur in other regions. In those showing the least change from the helical configuration (Fig. 3a), one protofibrillar element is separated laterally from the remainder of the microtubule, which retains its helical arrangement of subunits. The overall width of the microtubule here is *ca.* 260 Å and there is a *ca.* 50 Å gap between the separated protofibril and the remainder of the microtubule; the helical portion is approximately 180 Å wide.

The opposite extreme of separation of the subunits is shown in Figure 3e, in which there are 6 protofibrils with a lateral center-to-center spacing of 50–60 Å. The overall width of the microtubule has increased here to 370 Å.

Intermediate stages between the two extremes are numerous and four examples are shown in Figures 3b-e, where arrows indicate two, three, four and five lateral separations, respectively. Analysis of the intermediate stages indicates that whereas the lateral spacing between protofibrils varies from 50 to 70 Å, the center-to-center spacing between subunits along the length of the protofibrils is much more constant, with the 80 Å spacing characteristic of the helical configuration being maintained, as noted on the figures.

(3) The third arrangement of subunits is in the protofibrillar configuration (Fig. 4). This differs significantly from the protofibrillar arrangement described above (2) following lateral separation of the protofibrils, and also from the protofibrillar configuration described for cortical singlets in spermatozoa of other flatworms. The maximum number of protofibrils previously reported for negatively stained cortical singlets is 6 or 7 (Thomas, 1970), but in Figure 4, a complement of 12 protofibrils can be seen for a single microtubule. The overall width of the ribbon of protofibrils here is *ca.* 650 Å and the minimum lateral separation of the protofibrils is 45–50 Å. Furthermore, in contrast to the 80 Å longitudinal center-to-center spacing of subunits along the separated portions of the microtubules as described in (2) above, the longitudinal spacing here is 40–45 Å.

FIGURE 2. Intact cortical singlet microtubules (arrows) of a spermatozoon of *Macrostomum*, showing the compact helical configuration of subunits typical of the cortical singlets of some of the platyhelminths; magnification: 152,000 ×.

FIGURE 3. Cortical singlet microtubules of a spermatozoon of *Macrostomum*, showing examples of progressive stages in the lateral separation of the protofibrils. Figures 3a, b, c, d, and e show one, two, three, four and five lateral separations, respectively. In each figure arrows indicate the region of the microtubule representative of the stage. Other patterns can often be seen in adjacent regions of the same microtubule and in adjacent microtubules; magnification: 152,000 ×.

FIGURE 4. Cortical singlet microtubules of a spermatozoon of *Macrostomum* in which the subunits are in the protofibrillar configuration. Twelve protofibrils can be counted in the region between the two lines; magnification: 152,000 ×.

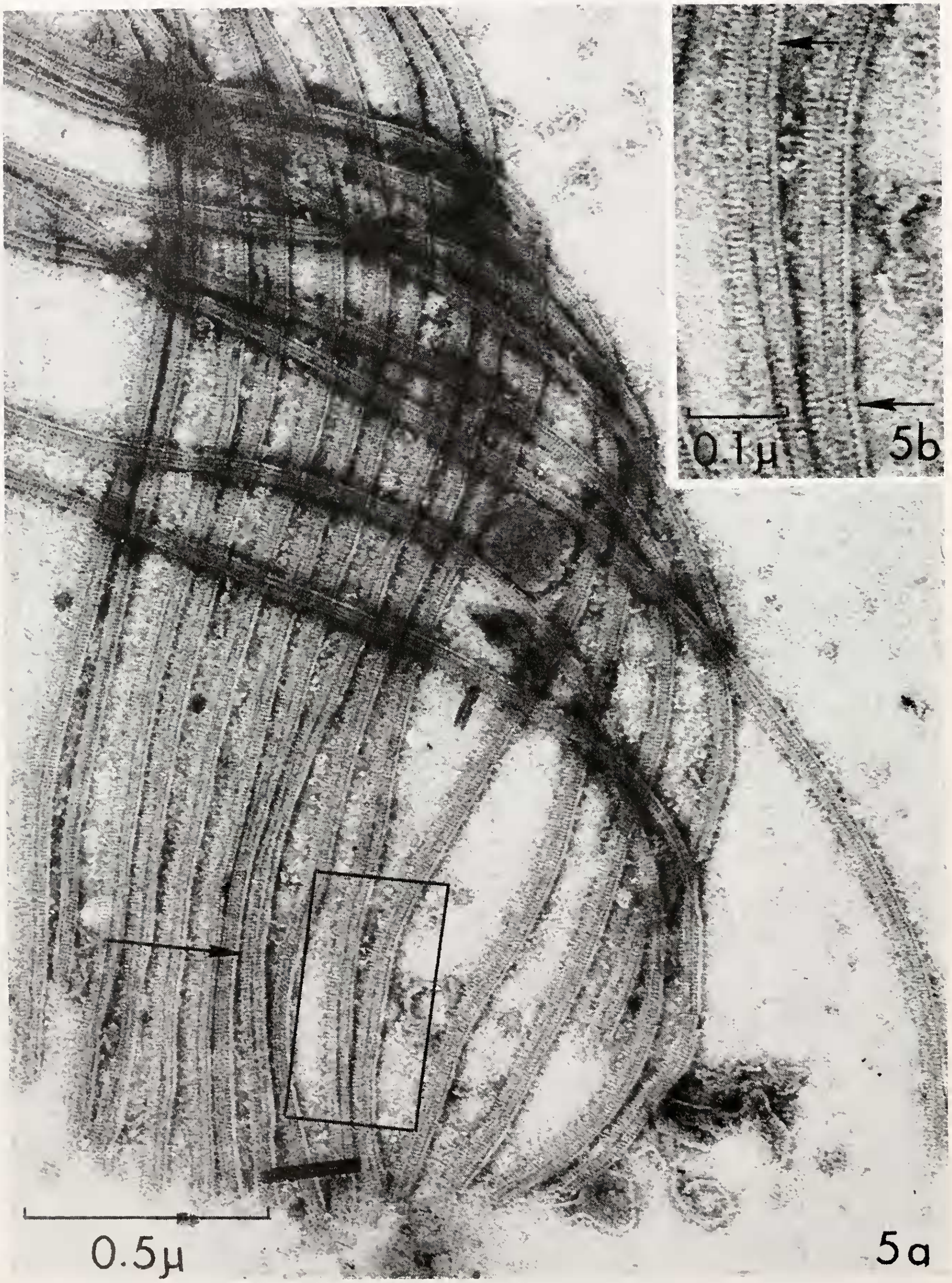


Figure 5a. Terminal portions of 17 cortical singlet microtubules. The appearance of two helical structures for each microtubule could result if the top half of each microtubule slid off the bottom half while the microtubule was still in the helical configuration. The arrow indicates the region in which the width is *ca.* 460 Å. A single protofibril is associated with the right half-microtubule in each case; magnification: 62,700 ×.

Figures 5a and 5b show regions in which the top halves of the microtubules have slid off the bottom halves, the subunits remaining in the helical configuration. Superficially observed, the microtubules here appear to branch into two (Fig. 5a, arrow) microtubules; however, there is no accumulation of the negative stain along the central longitudinal axis of each "subtubule," and therefore no indication of the presence of a lumen. The width of the "double" structure at the point indicated by the arrow is *ca.* 460 Å. The width following 5 lateral separations (Fig. 3e) was *ca.* 370 Å, and for one lateral separation the overall width was usually *ca.* 260 Å. In Figure 5a and adjacent micrographs (not shown) of the entire complement of microtubules, each of the 17 "paired" structures can be traced to 17 intact singlet microtubules. Of interest is the observation that in all 17 microtubules shown in Figure 5a, a single protofibril, of slightly less electron density than the remainder of the structure, is invariably located on the same side of all 17 microtubules (Fig. 5b, arrows). The significance of this observation is not known.

DISCUSSION

It has been suggested that the cortical singlet microtubules of the spermatozoa of *Plagiostomum* (Christensen, 1961), *Dugesia* and *Bdelloura* (Silveira and Porter, 1965) and *Mesotoma* (Henley *et al.*, 1969) are involved in motility. The cortical singlets from spermatozoa of *Haematolocchus* (Burton, 1966a, 1966b), *Stylochus* (Thomas, 1970) and *Notoplana* (Henley, in press) have been shown to have a helical arrangement of subunits. *Macrostomum* is the only species described thus far in which it is known that the spermatozoa are motile, with cortical singlets as their only microtubular component and with the subunits of the singlets helically arranged.

The transitions thus far described in the literature, from the helical to the protofibrillar configuration in cortical singlet microtubules, are usually quite abrupt (Burton, 1966a, 1966b; Thomas, 1970). In the cortical singlets described here, however, many stages in the transition are evident, providing a unique opportunity for understanding the event. This variability is undoubtedly the consequence, at least in part, of the macerating action of PTA (Henley, 1970), which makes feasible a study of the transitions in their various manifestations. Analysis of the changes which occur in the transition from the helical to the protofibrillar configuration suggests that two separate events occur. One change involves a lateral separation of the subunits to produce *ca.* 12 protofibrils, with a variable lateral spacing of 50–70 Å and a longitudinal center-to-center spacing of *ca.* 80 Å of subunits along the protofibril. The separation of any two adjacent protofibrils appears to occur at random, as evidenced by the wide variety of patterns shown in Figures 3a–e, and diagrammed in Figure 6. The diagram is based on the possible occurrence of 12 protofibrils, with the top six visible. Similar variability can, of course, be obtained with other numbers, but the observed range of patterns can be interpreted only with 11, 12 or 13 protofibrils.

The second change is in the spacing of the subunits along the length of a protofibril. In the helical configuration the subunits are spaced *ca.* 80 Å center-to-

---

FIGURE 5b. Enlargement of the area outlined by the rectangle in Figure 5a, showing the two helical portions and associated single protofibrils (arrows); magnification: 152,000 ×.

center along the length of the microtubule. This 80 Å spacing is maintained during lateral separation. However, in a truly protofibrillar configuration, such as that shown in Figure 4, the center-to-center spacing of the subunits is 40–45 Å. The possibility that this is a visual effect, produced by superimposition of protofibrils, is negated by the fact that the protofibrils are lying in parallel. Although

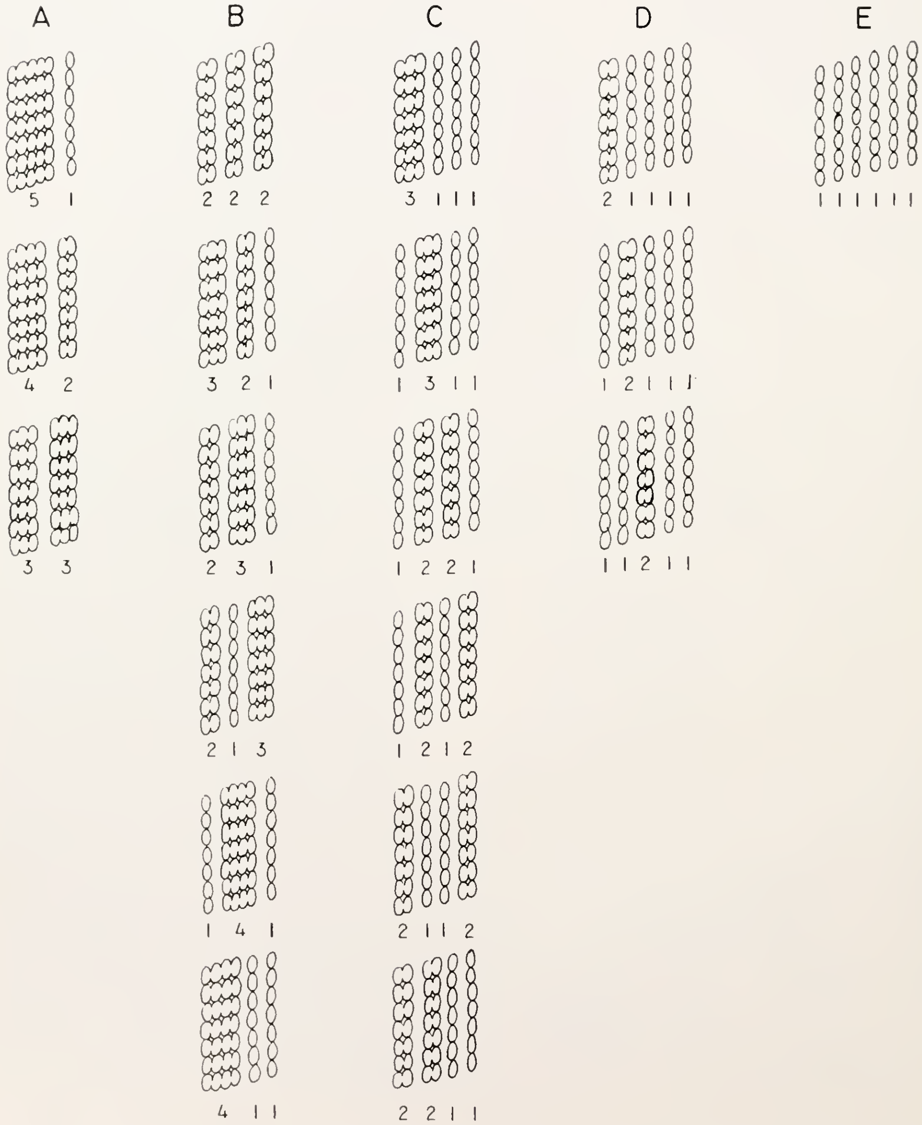

A
5 1
4 2
3 3
B
2 2 2
3 2 1
2 3 1
2 1 3
1 4 1
4 1 1
C
3 1 1 1
1 3 1 1
1 2 2 1
1 2 1 2
2 1 1 2
2 2 1 1
D
2 1 1 1 1
1 2 1 1 1
1 1 2 1 1
E
1 1 1 1 1 1

FIGURE 6. Diagram illustrating the possible array of patterns that could be exhibited by a microtubule if there are 12 protofibrils, of which the top 6 are visible, and if lateral separation of protofibrils occurs at random. Mirror images are not illustrated.

lateral separation can occur without a concomitant change in the longitudinal spacing, the change from 80 Å to 40–45 Å has never been observed by us to occur in the absence of lateral separation.

The shape and associations of the repeating units along the length of the intact microtubules in the helical configuration are not known. There are at least three possible models that could explain the presence of the alternating electron-lucent and electron-opaque bands which repeat at intervals of *ca.* 80 Å along the length of the microtubule (Fig. 7A). One such alternative is based on the assumption that the walls of the microtubules are made up of ovoid subunits which are *ca.* 80 Å in length and joined end to end along the length of the protofibrils (Fig. 7B). In the region in which contact between adjacent subunits occurs, a slight

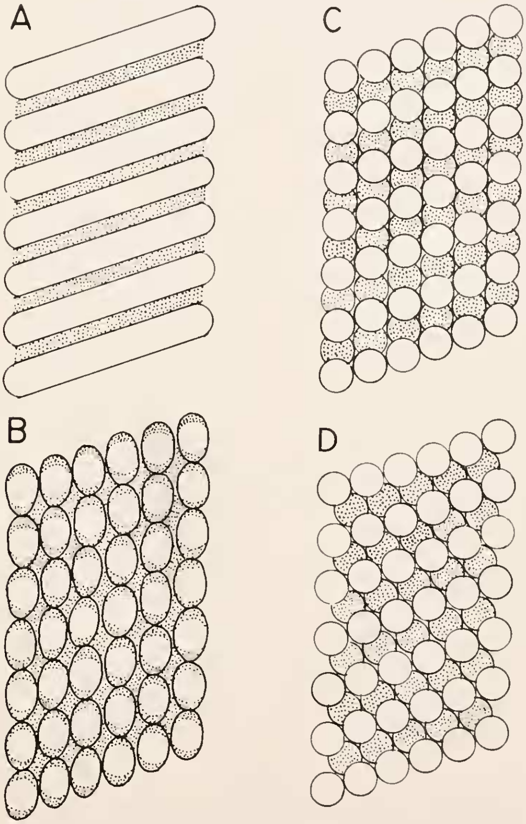


FIGURE 7. (A) Diagram of an intact cortical singlet microtubule as it appears following negative staining with PTA. The center-to-center spacing between adjacent white bands in this, as in (B), (C) and (D), is 80 Å; (B) Helically arranged ovoid subunits, joined end to end along the length of the protofibrils, as they might appear following negative staining; (C) and (D) Helically arranged globular subunits with alternating subunits slightly displaced toward the lumen of the microtubule, either parallel to the long axis of the microtubule (C) or nested among the outer subunits (D).

depression or groove would be formed in which the electron-opaque negative stain would accumulate, thereby producing alternating light and dark bands with an 80 Å repeat. The observed shift in spacing between subunits along the long axis of the microtubule, from the 80 Å periodicity in the intact microtubule (Fig. 2) to the 40–45 Å spacing in the truly protofibrillar configuration (Fig. 4), is in keeping with such a model of longitudinally oriented, elongated subunits, if a dimer-monomer relation were involved as well as a conformational change.

Two other models take into account the shift in spacing between subunits along the long axis of the microtubule. In one such model, alternate subunits along a protofibril are recessed slightly (about 10% of their diameters) toward the lumen of the microtubule (Fig. 7C). The recessed subunits could lie parallel to the protofibril (Fig. 7C) or nested among the outer subunits (Fig. 7D). In either case there would be formed around the microtubule a groove which would accumulate the electron-dense negative stain and produce the alternating bands with a repeat of 80 Å. A more widely spaced arrangement of outer subunits than those portrayed in Figures 7C and 7D is required here, since the recessed subunits would make a cylinder of smaller diameter.

There is biochemical evidence that the shift in spacing of subunits, from 80 Å in the intact microtubule to 40–45 Å in the protofibrillar configuration, may involve dissociation of dimers to form monomers along the length of the protofibrils. Shelanski and Taylor (1968) have reported that the subunits of microtubules in sea urchin sperm flagella can be isolated as dimers with a molecular weight of *ca.* 120,000 (and a corresponding particle size of 40–50 × 80–90 Å), or as monomers with a molecular weight of *ca.* 60,000 (and a particle size of 40 Å). If their biochemical results reflect the existence of dimers and monomers in the intact microtubule, then it is of interest to relate the occurrence of such configurations to the results observed here. The random nature of the lateral separation of subunits described gives no indication that monomers associate into dimers along the helical path (at an oblique angle to the long axis of the microtubule). However, the described shift in spacing of the subunits along the length of the protofibrils may be suggestive of an association of monomers to form dimers along the length of the protofibrils. Within such a framework, the formation of the groove to produce the alternating bands in the intact microtubule might be explained. If two monomers form an ovoid dimer with the long axis parallel to the long axis of the microtubule, the appearance might be similar to that shown in Figure 7B. Similarly, if one half of the dimer is inclined toward the lumen of the microtubule, the groove might be formed in a manner similar to that shown in Figures 7C and 7D. It is possible that freeze-etch or shadow-casting may give some information as to the contours of the subunits. Such experiments are in progress and may be useful in deciding among the possible alternatives.

SUMMARY

1. Cortical singlet microtubules are the only microtubular components of the motile spermatozoa of *Macrostomum*. When negatively stained with phosphotungstic acid, the microtubules display a helical arrangement of the subunits similar to that described for spermatozoa of other species of platyhelminths.

2. The protofibrillar configuration of subunits of the cortical singlets can also occur under conditions of negative staining. One microtubule was clearly observed to be made up of 12 protofibrils.

3. Analysis of various stages in the transition from the helical to the protofibrillar configuration suggests that there are two steps in the conversion. These are (a) a seemingly random lateral separation of subunits to form protofibrils with a longitudinal periodicity of *ca.* 80 Å, which is characteristic of the periodicity of the intact helical arrangement, and (b) a subsequent change in spacing of the subunits along the length of the protofibril, from *ca.* 80 Å to 40–45 Å. These observations support the view that if monomers associate to form dimers, the dimers occur along the length of the protofibril rather than between adjacent protofibrils.

LITERATURE CITED

André, J., and J.-P. Thiéry, 1963. Mise en évidence d'une sous-structure fibrillaire dans les filaments axonématiques des flagelles. *J. Microscop.*, **2**: 71–80.

Arnott, H. J., and H. E. Smith, 1969. Analysis of microtubule structure in *Euglena granulata*. *J. Phycol.*, **5**: 68–75.

Burton, P. R., 1966a. Substructure of certain cytoplasmic microtubules: an electron microscopic study. *Science*, **154**: 903–905.

Burton, P. R., 1966b. A comparative electron microscopic study of cytoplasmic microtubules and axial unit tubules in a spermatozoon and a protozoan. *J. Morphol.*, **120**: 397–424.

Burton, P. R., 1970. Optical diffraction and translational reinforcement of microtubules having a prominent helical wall structure. *J. Cell Biol.*, **44**: 693–699.

Christensen, A. K., 1961. Fine structure of an unusual spermatozoan in the flatworm *Plagiostomum*. *Biol. Bull.*, **121**: 416.

Gall, J. G., 1966. Microtubule fine structure. *J. Cell Biol.*, **31**: 639–643.

Grimstone, A. V., and A. Klug, 1966. Observations on the substructure of flagellar fibres. *J. Cell Sci.*, **1**: 351–362.

Henley, C., 1970. Changes in microtubules of cilia and flagella following negative staining with phosphotungstic acid. *Biol. Bull.*, **139**: 265–276.

Henley, C., in press. Platyhelminthes (Turbellaria). *In* A. C. Giese and J. S. Pearse, Eds. *Reproduction of Marine Invertebrates.* Academic Press, New York.

Henley, C., D. P. Costello, M. B. Thomas and W. D. Newton, 1969. The "9 + 1" pattern of microtubules in spermatozoa of *Mesostoma* (Platyhelminthes, Turbellaria). *Proc. Nat. Acad. Sci.*, **64**: 849–856.

Pease, D. C., 1963. The ultrastructure of flagellar fibrils. *J. Cell Biol.*, **18**: 313–326.

Shelanski, M. L., and E. W. Taylor, 1968. Properties of the protein subunit of central-pair and outer-doublet microtubules of sea urchin flagella. *J. Cell Biol.*, **38**: 304–315.

Silveira, M., and K. R. Porter, 1965. The spermatozoids of flatworms and their microtubular systems. *Protoplasma*, **59**: 240–265.

Thomas, M. B., 1970. Transitions between helical and protofibrillar configurations in doublet and singlet microtubules in spermatozoa of *Stylochus zebra* (Turbellaria, Polycladida). *Biol. Bull.*, **138**: 219–234.

Wolfe, J., 1970. Structural analysis of basal bodies of the isolated oral apparatus of *Tetrahymena pyriformis*. *J. Cell Sci.*, **6**: 679–700.

thinning toward the margin, of slender, compactly reticulate hyphae; thecium 40–60 µ high; paraphyses 1–1.5 µ, expanding slightly to enlarged apices which are surrounded by a gel which reaches a diameter of 6 µ, usually darkened on the outer surfaces, branched near the tip or unbranched, septate, sheathed, epithecium 5–10 µ thick, dark but not carbonaceous, gelified, dense; asci 40–48 × 17–22 µ, 8-spored, elongate-clavate when young but short and broadly clavate at maturity; ascospores 13–16 × 6.5–8(–9) µ, polaribilocular, the cells distinctly separated, each uninucleate, hyaline, ellipsoidal, the ends blunt to somewhat pointed.

Growing over mosses, *Umbilicaria cerebriformis,* sandy loam from granite, and dark greenish gray slate.

The thallus seems much reduced in this species. Apparently an areole functions as an assimilative unit for a certain time, then the biatorine apothecium develops just above the algal layer, covering the whole areole. Perhaps it is approaching heterotrophism by securing much of its nourishment from the *Rivularia* species with a corresponding reduction of thallus as is often found with increasing parasitism.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-2;* Skua Gull Peak, *P. Siple & S. Corey 72W-5, 72W-14;* Lichen Peak, *P. Siple & S. Corey 73-4, 73-7,* type.

BLASTENIA **grisea** Dodge & Baker, sp. nov.

Pl. 53, figs. 255–260.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-6.*

Thallus non assimilans ad 1 mm. longitudine, funiculis nigris, fimbriatis; thallus assimilans 20 × 8 mm., granulosus, lobatus, subfruticosus, delicatus, pallide flavus, olivaceo-alutaceus, griseus nigricansve; cortex male evolutus, cellulis fuscis isodiametricis in lateribus areolarum sparsis, fastigiatis; algae ad 10 µ, protococcoideae, sparsae, paucae; medulla 150–200 µ crassitudine, cellularis (sensu Nylander) ad apothecium, hyphis reticulatim dispositis; cortex inferior nullus.

Apothecia ad 0.65 mm. diametro, circularia, concava, marginata, raro subimmersa, aurantio-brunnea, rubro-brunnea vel nigra, KOH rubescens; amphithecium deest; parathecium 10–20 µ crassitudine, paucis cellulis eis epitheciorum similibus; hypothecium 30–40 µ crassitudine, hyalinum, hyphis tenuibus; thecium 40–50 µ altitudine; paraphyses 0.5–1.0 µ, apicibus 1.5 µ diametro, subflexuosi, septati, raro ramosi, epithecium 10–20 µ, hyalinum; asci 34–45 × 10–15 µ, breves, clavati, obtusi;

ascosporae octonae, 11–15 × 6–8 μ, polaribiloculares deinde uniseptatae, hyalinae, cellulis uninucleatis.

Non-assimilative thallus of black fimbriate strands up to 1 mm. long; assimilative portion 20 × 8 mm., granular to lobed, and almost dwarf-fruticose, very delicate, yellowish white to deep olive buff or gray and black; cortex not well developed except for a few lateral regions where scattered fuscous isodiametric cells are found with fastigiate dark cells over the algal layer; algae up to 10 μ, protococcoid, scattered in the thallus or occasionally near the surface, scant; medulla 150–200 μ thick, cellular *(sensu* Nylander) near the apothecium, but mostly of reticulately woven hyphae; lower cortex not differentiated.

Apothecia up to 0.65 mm. in diameter, small, more or less circular, concave with a small margin, sometimes almost immersed in the thallus, dull orange to red-brown and black, red with KOH; parathecium 10–20 μ thick, of a few cells scarcely differing from those of the adjacent epithecium; hypothecium 30–40 μ thick, hyaline, tapering slightly from the center, filamentous; thecium 40–50 μ tall; paraphyses 0.5–1.0 μ in diameter reaching 1.5 μ at the tips, somewhat flexuous, septate, occasionally branched, scarcely expanded above and not darkened, epithecium 10–20 μ, light; asci 34–45 × 10–15 μ, short-clavate, blunt at both ends at maturity, 8-spored; ascospores 11–15 × 6–8 μ, polaribilocular at first, becoming septate, hyaline, each cell uninucleate.

On arkosic sandstone.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-4, 73-6,* type.

KUTTLINGERIA

KUTTLINGERIA Trevisan, Riv. Period. Lav. Accad. Padova **5**: 72. 1857.

The type species is *K. Visianii* Trevisan *(Blastenia Visianica* Mass.). The other species originally included by Trevisan agree less well with the generic description and are considered as belonging in *Blastenia* Mass., from which this genus was segregated.

Thallus crustose, central portion granulose, areolate, margin effigurate, lobate to subfoliose, corticate; algae protococcoid;

medulla filamentous, basal cortex present. Apothecia biatorine, adnate; parathecium well developed; hypothecium hyaline; paraphyses branched or simple, capitate; asci clavate, 8-spored; ascospores polaribilocular at first, becoming uniseptate.

KUTTLINGERIA **rufa** Dodge & Baker, sp. nov.

Pl. 53, figs. 261–266; pl. 65, fig. 425.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-4.*

Thallus in area 1.5 cm. diametro radians, lobulis ad 1.1 mm. latitudine, irregulariter ramosis, marginibus impendentibus vel applanatis, in saxis appressus, rufus Martis vel salmoneo-aurantius albusve, KOH addito obscure rubescens; cortex 20–30 μ crassitudine, centro saepe abest, pseudoparenchymaticus, cellulis leptodermaticis; stratum gonidiale 55–60 μ crassitudine, coloniis paucis parvisque late dispositis; medulla ad 500 μ crassitudine, hyphis 3.5–4 μ diametro, laxe reticulatimque dispositis anastomosantibusque, in areis decorticatis compactioribus; cortex inferior similis cortici superiori.

Apothecia ad 0.3 mm. diametro, sparsa, sessilia, concoloria, convexa; amphithecium deest; parathecium male evolutum, paucis cellulis in cortice marginali mergens, cortex marginalis ad 15 μ crassitudine; hypothecium 30–40 μ, hyalinum, hyphis tenuibus compacte reticulatis; thecium 50–60 μ altitudine; paraphyses 1 μ diametro, apicibus 2–2.5 μ, cellula penultima maiore quam cellula ultima, ad 3.5 μ diametro, raro ad apicem ramosi, non vaginati, insuper septati, basaliter cellulis longioribus vel non septati, epithecium gelifactum, 5–10 μ crassitudine, brunneum; asci 44–55 × 11–14 μ, elongato-clavati juventute, latiores maturitate, apicibus vaginatis; ascosporae 12–15 × 5–7 μ, octonae, polaribiloculares, quaque cellula uninucleata, tenuiter ellipsoideae, apicibus subacutis.

Thallus radiate over an area 1.5 cm. in diameter, of irregularly branched lobes up to 1.1 mm. across, the margins overhanging, flattened, closely attached to the substratum, Mars red to salmon orange, white over decorticate portions in the center of the thallus, dark red with KOH; upper cortex 20–30 μ thick where best developed, pseudoparenchymatous, an even layer of thin-walled cells; algal layer 55–60 μ thick, of a few small colonies scattered through the layer; medulla up to 500 μ thick, of rather coarse hyphae 3.5–4 μ in diameter loosely reticulate and anastomosed, in the decorticate areas extending to the surface where it is thicker and more closely reticulate but never stratified, slightly more compact in areas adjacent to the cortex; lower cortex similar to the upper cortex.

Apothecia up to 0.3 mm. in diameter, scattered, sessile, usually well back from the extremities of the lobes, concolorous with the thallus, convex, strongly so when young, but without an amphithecium; parathecium thinning above, an upward continuation of the hypothecium merging with the cortex which reaches about 15 μ thick; hypothecium 30–40 μ thick, hyaline, of slender closely reticulated hyphae; thecium 50–60 μ tall; paraphyses 2–2.5 μ at the tip, tapering to 1 μ in diameter below, the penultimate cell often exceeding the apical cell, up to 3.5 μ in diameter, occasionally branched near the tips, without sheaths, septate above, of longer cells or undivided below, epithecium 5–10 μ, gelified, golden brown to darker brown; asci 44–55 × 11–14 μ, 8-spored, elongate-clavate when young, broadly so at maturity, sheath apically prominent; ascospores 12–15 × 5–7 μ, polaribilocular, each cell uninucleate, slender-ellipsoidal with somewhat pointed ends.

On biotite sericite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-4*, type.

KUTTLINGERIA **rutilans** Dodge & Baker, sp. nov.

Pl. 53, fig. 267; pl. 54, figs. 268–270.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-9.*

Thallus ad 15 mm. diametro, foliosus vel subfruticosus, lobatus, lobis elongatis, angustis, contortis, irregulariter dichotome ramosis, rutilans; cortex 8–12 μ crassitudine, cellulis isodiametricis; algae protococcoideae, ad 10 μ diametro, sub cortice sparsae, paucae, sub apothecio gregariae; medulla laxissime contexta, hyphis tenuibus; cortex inferior bene evolutus, cum superiore congruens.

Apothecia ad 0.5 mm. diametro, sine margine conspicua, rufus; amphithecium deest; parathecium 40–50 μ crassitudine, hyalinum, hyphis septatis, 3–4 μ, dense implexis, sub hypothecio continuum; hypothecium 10–12 μ crassitudine, hyalinum, hyphis irregulariter implexis; thecium 50–65 μ altitudine; paraphyses 0.5 μ diametro, capitibus majoribus, vaginatis, ad 3.5 μ diametro, simplices vel ramosi, septati, hyalini, epithecium 5–10 μ crassitudine, flavum, crystallis numerosissimis; asci 55–64 × 14.5–15 μ, elongati, clavati, obtusi, vaginati; ascosporae octonae, 12.5–13.5 × 7–8 μ, polaribiloculares, uninucleatae, hyalinae.

Non-assimilative portion lacking; assimilative thallus up to 15 mm. in diameter, foliose to subfruticose, lobes long, narrow, contorted, irregularly dichotomously branched, grenadine red to English red; cortex 8–12 μ thick, a dense layer of isodiametric cells, only the outermost darkened; algae protococcoid, up to 10 μ in diameter, scattered near the upper cortex, few, more closely packed below the apothecium; medulla very loosely woven, of slender hyphae; lower cortex identical with the upper.

Apothecia up to 0.5 mm. in diameter, flattened, without a conspicuous margin, grenadine red to English red; amphithecium absent; parathecium 40–50 μ thick, hyaline, of closely woven septate hyphae 3–4 μ in diameter continued below the hypothecium which is 10–12 μ thick, hyaline, of closely and irregularly woven cells, not tapering outward; thecium 50–65 μ tall; paraphyses 0.5 μ in diameter, gradually expanding to larger cells near the tips, heads with conspicuous sheaths up to 3.5 μ in diameter, branched or simple, hyaline throughout, epithecium 5–10 μ thick, yellow, composed of numerous crystals; asci 55–64 × 14.5–15 μ, elongate, clavate, rather blunt, with a conspicuous sheath, 8-spored; ascospores 12.5–13.5 × 7–8 μ, polaribilocular, cells uninucleate, hyaline.

Loose on moss clumps and sandy loam.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-9*, type.

HUEA

Huea Dodge & Baker, gen. nov.

The type species is *Huea flava* Dodge & Baker.

Thallus crustosus, rugosus, granulosusve, ecorticatus corticatusve; algae protococcoideae; cortex inferior non evolutus. Apothecia sessilia, circularia, nigra; parathecium nigrum, carbonaceum, pseudoparenchymaticum, sub hypothecio continuum; hypothecium fuscum, hyphis tenuibus dense compactum; epithecium nigrum; ascosporae octonae, ellipsoideae, hyalinae, polaribiloculares. Spermogonia immersa, ostiolis nigris, spermatiophorae ramosae, articulatae; spermatia cylindrica, brevia, recta.

Thallus crustose, uniform, rugose, granulose, attached to the substrate by the medullar hyphae, heteromerous, ecorticate or corticate; algae protococcoid; basal cortex not differentiated. Apothecia sessile, circular, black; parathecium black, carbonaceous, pseudoparenchymatous, continued in a thick layer below the hypothecium which is dark; epithecium black, asci 8-spored; ascospores ellipsoid, hyaline, polaribilocular. Spermogonia immersed, with a black ostiole, spermatiophores branched and closely septate; spermatia cylindric, short, straight.

So far as known, this genus is confined to the Antarctic. **Huea cerussata** (Hue) Dodge & Baker, comb. nov. *(Lecidea (Blastenia) cerussata* Hue, Deuxième Exp. Antarct. Franç. Lichens, 101. 1915) and **Huea coralligera** (Hue) Dodge & Baker, comb. nov. *(Lecidea (Blastenia) coralligera* Hue, Deuxième Exp. Antarct. Franç. Lichens, 102. 1915) have been described from the Graham Land Archipelago. Hue first pointed out these species as differing from all other species in his section *Blastenia* in the structure of the parathecium; hence it gives us pleasure to dedicate this genus to him.

KEY TO ANTARCTIC SPECIES

Thallus ecorticate, yellow, granulose.................................. *H. flava*
Thallus corticate.
  Thallus whitish, surface rugose to granulose, verrucose; cortex 10–40 μ, without layer of dead cells.................................. *H. cerussata*
  Thallus ashy to black, surface coralloid; cortex 20 μ, with layer of dead cells.................................. *H. coralligera*

HUEA **flava** Dodge & Baker, sp. nov.

Pl. 54, figs. 271–275.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-10.*

Thallus assimilans ad 1.5 mm., granulosus, mollis madefactus, flavus; ecorticatus; algae ad 18 μ diametro, protococcoideae, per thallum sparsae, paucae; medulla circa 200 μ diametro, hyphis 2–3 μ diametro, pachydermaticis, reticulatim dispositis, densioribus ad algas et in basi; cortex inferior deest.

Apothecia ad 0.25 mm. diametro, irregulariter circularia, marginata, nigra, carbonacea; amphithecium deest; parathecium 20–30 μ crassitudine, cellulis nigris pachydermaticis, carbonaceum, sub hypothecio continuum; hypothecium 10–15 μ crassitudine, brunneum fuscumve, hyphis dense compactis; thecium 30–40 μ altitudine; paraphyses 1–1.5 μ, apicibus vaginatis, ad 4 μ diametro, obscure griseoviridibus, septati, simplices, raro ramosi, epithecium 5–10 μ, obscurum; asci 27–36 × 10–14 μ, clavati, vaginati; ascosporae octonae, 8–9 × 4–4.5 μ, polaribiloculares, ellipsoideae, hyalinae, cellulis uninucleatis.

Non-assimilative portion of thallus lacking; assimilative thallus up to 1.5 mm. in diameter, scant, granulose, soft when moistened, yellow; ecorticate; algae up to 18 μ in diameter, protococcoid, few, scattered in the thallus; medulla about 200 μ thick, of thick-walled hyphae 2–3 μ in diameter, loosely reticulate, closer near the algae and near the base; lower cortex lacking.

Apothecia up to 0.25 mm. in diameter, irregularly circular, marginate, black, carbonaceous; amphithecium not developed; parathecium 20–30 μ thick, of thick-walled black cells, so dark their individuality is obscured, continuous under the hypothecium, tapering slightly at the margin; hypothecium 10–15 μ thick, brown to fuscous, of densely interwoven hyphae; thecium about 30–40 μ tall; paraphyses 1–1.5 μ in diameter, apical cells surrounded by large gelified sheaths up to 4 μ in diameter, dark greenish gray, septate, simple or rarely branched; epithecium 5–10 μ, dark; asci 27–36 × 10–14 μ, clavate, with a small sheath, 8-spored; ascospores 8–9 × 4–4.5 μ, polaribilocular, the cells separate, each uninucleate, hyaline, ellipsoidal.

On weathered coarse-grained pinkish gray granite, fine-grained dike, and sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7;* Lichen Peak, *P. Siple & S. Corey 73-7, 73-10,* type; Mt. Stancliff, *P. Siple & S. Corey 72A-1.*

PYRENODESMIA

PYRENODESMIA Massalongo, Atti I.R. Ist. Veneto, II. **3**: 119. 1853.

Callopisma DeNotaris, Giorn. Bot. Ital. II. **2**: 198. 1847, non *Callopisma* Martius, Nov. Gen. Sp. Pl. **2**: 107. *pl. 183, 184.* 1827 (Gentianaceae).

Caloplaca Th. Fries, Lich. Arctoi, 218. 1860.

The type of *Pyrenodesmia* is not designated. *P. Agardhiana* (Fw.) Mass., *P. chalybaea* (Fr.) Mass., *P. olivacea* Mass., and *P. variabilis* (Pers.) Mass. were treated, all in *Caloplaca* sect. *Eucaloplaca* as understood by recent authors. The type of *Callopisma* may be chosen as *C. cerina* (Ehrh.) DNtrs., since *C. murorum* (Hoffm.) DNtrs. and *C. vulgaris* DNtrs. were transferred to *Gasparrinia* by Tornabène in 1849 and by DeNotaris to *Aglaopisma* in Baglietto in 1856. The type of *Caloplaca* was not designated. Seven species were listed, of which *C. cerina* (Ehrh.) Th. Fr. may be taken as the type, since Th. Fries merely intended *Caloplaca* to replace *Callopisma* which had previously been used by Martius.

Thallus crustose, attached to the substrate by the hyphae of the prothallus or of the medulla, without rhizinae, uniform, mostly yellow and becoming purple with KOH, heteromerous; ecorticate or nearly so; algae *Protococcus;* medulla arachnoid, of thin-walled hyphae. Apothecia round, appressed or sessile, seldom immersed, lecanorine with well-developed amphithecium containing cortex, algal layer, and medulla; epithecium granulose to powdery, usually becoming purple or violet with KOH; hypothecium hyaline, lying above the algal layer; paraphyses simple, septate, capitate; asci 8-spored; ascospores hyaline, ellipsoidal to rhomboidal, usually polaribilocular, often the cells appearing connected by an isthmus. Spermogonia immersed, with a hyaline wall, spermatiophores close-septate; spermatia short, straight, elongate to cylindrical.

KEY TO ANTARCTIC SPECIES

Growing over mosses.
  Thallus not developed; ascospores 10–12 × 7–9 μ.................*P. athallina*
  Thallus well developed, ecorticate; sterile.......................*P. Darbishirei*
Saxicolous.
  Cortex of vertical hyphae, upper half fastigiate; thecium 90–100 μ; ascospores 12–16 × 7–8 μ....................................*P. cinericola*
  Cortex of intricate hyphae.
    Cortex 20–30 μ; thecium 80–100 μ; ascospores 12–16 × 5–7 μ......*P. citrina*
    Cortex 30–70 μ; thecium 70–80 μ; ascospores 12–24 × 6–14 μ....*P. aurantiaca*

PYRENODESMIA **Darbishirei** Dodge & Baker, sp. nov.
Pl. 62, figs. 401–403; pl. 63, fig. 411.

Physcia cirrhochroa Darbishire, Nat. Antarct. [Discovery] Exp. Nat. Hist. **5**: Lichenes, 9. 1910, non Ach.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-14.*

Pars non assimilans inconspicua, male evoluta, funiculis obscuris hypharum, cellulis irregularibus, interne amorpha; pars assimilans ad 2 mm. diametro, 0.50 mm. altitudine, in solo inter muscos, flava vel ochraceo-aurantiaca, inferne albida, KOH rubro-aurantiaca, irregularia, flabellata, marginibus crenulatis; cortex non evolutus, superficie amorpha, 2–8 μ crassitudine; algae protococcoideae, coloniis subsphericis per totam areolam basi excepto dispositis; medulla cellulis irregularibus leptodermaticis, inferne reticulata, cellulis pachydermaticis subbrunneis; stratum basale non evolutum sed cellulis imis medullaribus pachydermaticis obscurisque.

Non-assimilative portions inconspicuous, not well developed, of dark hyphal strands of irregular cells without definite organization, internally amorphous; assimilative portions up to 2 mm. in diameter and 0.50 mm. high, growing on soil among mosses, often conspicuous over areas of 2–3 cm., primuline yellow to ochraceous orange becoming almost white at the bottom, changing to bright orange-red on the addition of KOH, irregular, flabellate, edges crenulate; upper cortex not differentiated, the outer surface amorphous to a depth of 2–8 μ; algae scattered throughout the areolae except the base, protococcoid, in subspherical colonies; medulla of irregular thin-walled cells near the base, becoming more open and reticulate, the cells with thicker walls, slightly brownish; lower cortex not morphologically differentiated, the lowest row of cells often having the outermost surfaces thickened and dark. Sterile.

Apparently growing over mosses and an old lichen thallus with ellipsoidal colonies of *Nostoc* which has been parasitized by a common brown hyphomycete.

While we have not seen Darbishire's material this seems to be the same imperfect lichen referred by him to *Physcia cirrhochroa* Ach. From the structure of the thallus it seems much more closely related to *Pyrenodesmia.* Darbishire suggested a possible relationship to *Placodium,* i. e. *Gasparrinia,* but its ecorticate condition excludes it from that genus.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-2, 72W-7, 72W-14,* type; Lichen Peak, *P. Siple & S. Corey 73-3, 73-4, 73-7;* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-1.*

PYRENODESMIA **athallina** (Darbishire) Dodge & Baker, comb. nov.

Caloplaca athallina Darbishire, Wiss. Ergebn. Schwed. Südpolar-Exp. 1901-1903. . . Nordenskjöld **4**^{11}: 9. *pl. 2. f. 14.* 1912.

Type: Graham Land, Paulet Island, *Skottsberg.*

PYRENODESMIA **aurantiaca** (Lightfoot) Dodge & Baker, comb. nov.

Lichen aurantiacus Lightfoot, Fl. Scotica **2**: 810. 1777.

Caloplaca aurantiaca Th. Fries, Nova Acta R. Soc. Sci. Upsal. III. **3**: 219. 1861.

Type: Scotland, *Lightfoot.*

Reported from the Graham Land Archipelago.

PYRENODESMIA **cinericola** (Hue) Dodge & Baker, comb. nov.

Lecanora (Caloplaca) cinericola Hue, Deuxième Exp. Antarct. Franç. Lich. 72–73. 1915.

Caloplaca cinericola Darbishire, Brit. Antarct. [Terra Nova] Exp. 1910, Bot. **3**: 54. 1923.

Type: Graham Land Archipelago, Deception Island, near Pendulum Cove, *Gain.* This species has a much better developed cortex than is usual in this genus and is referred here on account of its uniform areolate thallus.

GASPARRINIA

GASPARRINIA Tornabène, Lichenogr. Sicula, 27. 1849.

Amphiloma Koerber, Syst. Lich. Germ. 110. 1855, non *Parmelia* sect. *Amphiloma* Fries, Lichenog. Eur. Reform. 87. 1831.

Aglaopisma DeNotaris ap. Baglietto, Mem. Accad. Sci. Torino, II. **17**: 396. 1856.

No type species was designated. Eight species were listed, of which three belong elsewhere. Of the five remaining, two belong in *Pyrenodesmia,* leaving three in the group as subsequently understood. Th. M. Fries retained this group as a subgenus of *Caloplaca* for *C. callopisma* (Ach.) Th. Fr. *(Callopisma vulgaris* DeNotaris), *C. murorum* (Hoffm.) Th. Fr., and added *C. elegans* (Link) Th. Fr. and *C. cirrochroa* (Ach.) Th. Fr. Since Tornabène regarded *C. callopisma* as a variety of *G. murorum* (Hoffm.) Torn., we may choose the latter as the type. Koerber, in proposing *Amphiloma,* discusses *A. elegans* (Link) Koerb. and *A. murorum* (Hoffm.) Koerb. in detail and five other species briefly. If *A. murorum* is taken as the type, the name is an exact synonym of *Gasparrinia;* if *A. elegans* (Link) Koerb. be chosen it must be shown that it is not congeneric with *Gasparrinia murorum*. *Aglaopisma* was based on *A. murorum* (Hoffm.) DNtrs. and *A. vulgaris* DNtrs. (*Gasparrinia murorum* v. *callopisma* Tornabène). Therefore this also is an exact synonym of *Gasparrinia.*

Thallus crustose, attached to the substrate directly, or by rhizinae, effigurate or lobed and subfoliose at the margin, mostly yellow and becoming purple with KOH, heteromerous; corticate on both surfaces, cortex pseudoparenchymatous, cells thin-walled; algae *Protococcus*; medulla arachnoid, of thin-walled hyphae. Apothecia round, appressed or sessile, lecanorine; amphithecium containing cortex, algae, and medulla; epithecium granulose or powdery, usually becoming purple or violet with KOH; hypothecium hyaline, lying above the algal layer; paraphyses simple, septate, capitate; asci 8-spored; ascospores hyaline, ellipsoidal, polaribilocular, cells often connected by an isthmus. Spermogonia immersed with a hyaline wall, spermatiophores close-septate; spermatia short, straight, cylindric.

KEY TO ANTARCTIC SPECIES

Margin laciniate but more or less indeterminate.
  Apothecia up to 1.5 mm.; laciniae white, ciliate; medullar hyphae vertical; thecium 110–120 μ.. *G. Joannae*
  Apothecia about 0.6 mm.
    Thallus areolate, laciniate; medullar hyphae vertical; thecium 100 μ.. *G. sublobulata*
    Thallus reticulate, laciniate; medullar hyphae horizontal; thecium 70–80 μ.. *G. inordinata*
Margin thick.
  Laciniae 0.2–0.3 mm. broad, with sorediose tips; spores 11–18 × 5–6 μ; thecium 80–90 μ.. *G. cirrochrooides*
  Laciniae not sorediose.
    Laciniae torulose, unequal, often shining; spores 11 × 5 μ.......... *G. lucens*
    Laciniae cylindric, center granular; spores 14–18 × 7–9 μ; cortex thick and differentiated into two layers.......................... *G. Gainii*
    Laciniae flattened, center areolate; spores 11–16 × 6–9 μ.......... *G. elegans*
    Laciniae flattened, center subareolate, verrucose; spores 11–16 × 4–7 μ; lower cortex often almost absent.
      Thallus yellow-orange, 0.3–0.5 μ thick, pruinose............. *G. murorum*
      Thallus red-orange and browning, thinner, not pruinose........ v. *miniata*
    Laciniae flattened, center continuous; spores 12.5–16 × 5–8 μ; lower cortex well developed with rhizoidal strands adhering to the rock, cadmium orange to orange-chrome, not pruinose........................ *G. Siplei*

GASPARRINIA **Siplei** Dodge & Baker, sp. nov.

Pl. 54, figs. 287–289; pl. 55, figs. 290–296; pl. 65, figs. 429, 431.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-6.*

Thallus ad 20 mm. diametro, subfoliosus, centro continuo, marginibus lobatis, lobis planis, subelevatis, ad 1 mm. latitudine, dichotome vel varie ramosis, apicibus frequenter subdigitatis, lobis minoribus subtorulosis, aurantiacus, KOH addito rufescens; cortex superior 20–40 μ crassitudine, cellulis leptodermaticis isodiametricis, 2–4 μ diametro, laxe contextus, strato 2–5 μ crassitudine, cellularum emortuarum tectus; algae protococcoideae, ad 15 μ diametro, in medulla sparsae et stratum irregulare sub cortice formantes; medulla 180–500 μ crassitudine, hyphis leptodermaticis, 1.5–3 μ diametro, ramosis, irregulariter contexta, densius circum algas; cortex inferior 12–30 μ crassitudine, cellulis isodiametricis leptodermaticis, exteris obscuris; rhizinae cellulis 2–3 μ diametro, fastigiatis, exteris obscuris.

Apothecia ad 1.5 mm. diametro, juventute marginibus inflexis, subconcava vel plana maturitate, aurantiaca, singula vel caespitosa, sessilia; amphithecium 100–150 μ crassitudine, cortice fastigiato, algis multis, sub hypothecio, non in amphithecio penetrantibus, medulla ut in thallo; parathecium 20–30 μ crassitudine, hyalinum, insuper hyphis fastigiatis; hypothecium 30–50 μ crassitudine, hyphis dense compactis, hyalinum ad margines tenuescens; thecium 70–80 μ altitudine; paraphyses 0.75–1.0 μ subtus, cellulis longis, insuper incrassati, cellulis brevibus capitibus ad 3.5 μ diametro, subsphericis, crustati, KOH addito subvirescens, epithecium 10–12 μ crassitudine; asci 60–75 × 11.5–17 μ, elongati et late clavati; ascosporae octonae, 12.5–16 × 5–8 μ, biloculares, cellulis uninucleatis, ellipsoideae, apicibus obtusis vel acutis, hyalinae.

Thallus up to 20 mm. in diameter, subfoliose, center continuous, margin lobed and somewhat elevated; lobes flattened or subcanaliculate, up to 1 mm. wide, dichotomously or variously branched, tips often somewhat digitate, the smaller lobes sometimes little branched and somewhat torulose, cadmium orange to orange chrome, turning bright red with KOH; upper cortex 20–40 μ thick, of thin-walled isodiametric cells 2–4 μ in diameter, somewhat loosely packed, covered by an outer layer 2–5 μ thick of dead cells; algae protococcoid, up to 15 μ in diameter, abundant, scattered in the medulla and forming an irregular layer beneath the cortex; medulla 180–500 μ thick, of thin-walled hyphae 1.5–3 μ in diameter, branching and anastomosing to form an open network, sometimes more closely packed about the algae; lower cortex 12–30 μ thick, of thin-walled, isodiametric cells 2–4 μ in diameter, outer cells darkened, without dead cells; rhizinae common, cells 2–

3 μ in diameter, densely packed in a palisade, darkened on the outer surfaces.

Apothecia up to 1.5 mm. in diameter, margins strongly inrolled when young, only slightly concave or plane at maturity, cadmium orange to orange chrome, single or densely crowded in the center of the thallus, sessile; amphithecium 100–150 μ thick, cortex fastigiate with a gradual transition below to that of the thallus; algae abundant, in a dense layer 40–70 μ thick below the hypothecium, not penetrating the amphithecium, medulla similar to that of the thallus; parathecium 20–30 μ thick, hyaline, fastigiate above; hypothecium 30–50 μ thick, of densely woven hyphae similar to those of the medulla, hyaline, tapering gradually outward; thecium 70–80 μ tall; paraphyses 0.75–1.0 μ in diameter below, cells very long, septa rare, tapering gradually toward the tips with more frequent septa, heads of 3–5 shorter cells, up to 3.5 μ in diameter, the ultimate cells subspherical, covered by a thick rough incrustation, slightly greenish with KOH, branched or simple with a thin sheath above which disappears below, epithecium 10–12 μ thick; asci 8-spored, 60–75 × 11.5–17 μ, elongate and broadly clavate; ascospores 12.5–16 × 5–8 μ, 2-celled, each cell separate with its own nucleus, ellipsoidal with blunt or pointed ends, hyaline.

On erratic fine-grained pink granite, biotite-sericite, orthoclase-sericite-siderite schist, sericite schist, and fine-grained dike.

The systematic position of this species is not clear. The algae do not penetrate the amphithecium as is usual in lecanorine apothecia. On the other hand, there seems to be a differentiation of tissues corresponding to amphithecium and parathecium, the amphithecium being of thalline derivation while the parathecium is connected with the hypothecium. Since no algae occur above the hypothecium in the margin, some might refer the species to *Kuttlingeria.* It is possible, however, that it should be referred to **Xanthoria antarctica** (Vainio) Dodge & Baker, comb. nov. [*Xanthoria lychnea* f. *antarctica* Vainio, Exp. Antarct. Belge Res. Voy. S.Y. Belgica, Bot. Lichens, 22. 1903] on account of the thick continuous center of the thallus and its rhizinae. The latter species has lacerate and granulate lobes and is sterile, while *G. Siplei* has smooth lobes and is abundantly fruiting. Immature spermogonia on our plant would also suggest reference to *Xanthoria* since they apparently occur in groups of 3–5 immersed in thalline warts at the tips of the lobes rather than singly immersed in the thallus as in *Gasparrinia*. The wall is thin, hyaline, very deeply staining, and the contents are not completely differentiated.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-6*, type, *72W-7, 72W-14;* Mt. Stancliff, *P. Siple & S. Corey 72A-1;* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-2.*

GASPARRINIA **cirrochrooides** (Vainio) Dodge & Baker, comb. nov.

Placodium cirrochrooides Vainio, Res. Voy. S.Y. Belgica, 1897–1899, Bot. Lich. 24. 1903.

Caloplaca (Gasparrinia) cirrochrooides Zahlbr., Cat. Lich. Univ. **7**: 225. 1931.

Type: Graham Land Archipelago, Danco Land, Cape Anna Osterrieth, 64° 33′ S., *E. G. Racovitsa.*

GASPARRINIA **inordinata** (Hue) Dodge & Baker, comb. nov.

Lecanora (Placodium) inordinata Hue, Deuxième Exp. Antarct. Franç. Lich. 70. 1915.

Placodium inordinata Darbishire, Brit. Antarct. [Terra Nova] Exp. 1910. Bot. 53. 1923.

Caloplaca (Gasparrinia) inordinata Zahlbr., Cat. Lich. Univ. **7**: 241. 1931.

Type: South Shetlands, Deception Island, *Gain 73.*

GASPARRINIA **Joannae** (Hue) Dodge & Baker, comb. nov.

Lecanora (Placodium) Joannae Hue, Deuxième Exp. Antarct. Franç. Lich. 68. 1915.

Placodium Joannae Darbishire, Brit. Antarct. [Terra Nova] Exp. 1910. Bot. 53. 1923.

Caloplaca (Gasparrinia) Joannae Zahlbr., Cat. Lich. Univ. **7**: 241. 1931.

Type: Graham Land, Booth-Wandel Island, *Gain 119.*

GASPARRINIA **lucens** (Nylander) Dodge & Baker, comb. nov.

Lecanora elegans f. *lucens* Nylander ap. Crombie, Jour. Linn. Soc. Bot. **15**: 184. 1876.

Placodium lucens Nylander, Lich. Nov. Zelandiae, 145. 1888.

Caloplaca (Gasparrinia) lucens Zahlbr., Deutsch. Südpolar Exp. 1901–1903, **8**: 29. 1906.

Type: Kerguelen Land, Observatory Bay, *A. E. Eaton.*

GASPARRINIA **sublobulata** (Nylander) Dodge & Baker, comb. nov.

Placodium sublobulatum Nylander, Lich. Fueg. Patagon. 7. 1887.

Lecanora (Placodium) sublobulata Hue, Deuxième Exp. Antarct. Franç. Lich. 69. 1915.

Caloplaca (Gasparrinia) sublobulata Zahlbr., Cat. Lich. Univ. **7**: 267. 1931.

Type: Staten Island, *C. Spegazzini.*

POLYCAULIONA

POLYCAULIONA Hue, Exp. Antarct. Franç. (1903–1905) Sci. Nat. Lich. 8. 1908.

Placodium sect. *Thamnoma* Tuckerman, Gen. Lich. 107. 1872.

The type species is *Polycauliona regalis* (Vainio) Hue. The type of *Placodium* sect. *Thamnoma* is *Placodium coralloides* Tuckerman.

Thallus fruticulose, yellow to chestnut, structure radiate, erect or decumbent at the periphery, dichotomous or irregularly branched, branches often short and nodulose; cortex completely surrounding the thallus, duplex, the outer zone amorphous, from hyphae perpendicular to the axis, the inner more branched and much more slender; algae *Protococcus,* medulla of hyphae parallel to the axis, closely conglutinate. Apothecia terminal on the main axis or branches, constricted at the base, concave then flattened, disc orange; amphithecium and parathecium well developed; hypothecium hyaline; paraphyses hyaline, yellow, or rufous above; asci cylindric or somewhat ventricose in the middle, base caudate, 8-spored; spores hyaline, unicellular or polaribilocular. Spermogonia terminal on the axis and branches, round, spermatia cylindric, straight, septate.

Our species differ from those previously referred to *Polycauliona* in having the central portion of the medulla so loosely woven as to appear almost hollow, much as the section *Eumitria* differs from the other sections of *Usnea.*

KEY TO ANTARCTIC SPECIES

- Spores unicellular; thallus brown.................................*P. Charcoti*
- Spores polaribilocular.
  - Thallus greenish...*P. luctuosa*
  - Thallus yellow.
    - Thallus erect, up to 30 mm. high...............................*P. regalis*
    - Thallus prostrate, 3 mm. high.
      - Lobes terete...................................*P. regalis* f. *prostrata*
      - Lobes flattened, subcanaliculate..........................*P. coralligera*
  - Thallus scarlet to deep orange above.
    - Thallus in large pulvinate tufts.............................*P. pulvinata*
    - Thallus small, scattered, often growing over other lichens and mosses..... ....*P. sparsa*

POLYCAULIONA **pulvinata** Dodge & Baker, sp. nov.

Pl. 54, figs. 276–280; pl. 65, fig. 430.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-3.*

Thallus suffruticosus, dense pulvinatus, ad 25 mm. diametro, 7–8 mm. altitudine, lobis torulosis applanatisve, intricate ramosis, aurantiacus cadmii aut capucino-flavus, subtus dilute flavo-aurantiacus; cortex 30–50 μ crassitudine, cellulis 2–5 μ diametro, isodiametricis, cum strato cellularum emortuarum ad 5 μ crassitudine; algae ad 12 μ diametro, protococcoideae, singulae aut in coloniis parvis per totum thallum sparsae; medulla ad 250 μ crassitudine, funiculis hypharum leptodermaticarum circa 2 μ diametro, laxe intertextis; cortex inferior 30–65 μ crassitudine, cortici superiori similis.

Apothecia ad 1 mm. diametro, marginata, concava, aurantiaca Martis aut rufa Anglorum; amphithecium 90–100 μ crassitudine; cortex ei thalli similis; algae coloniis parvis sparsae; parathecium non evolutum; hypothecium 20–30 μ crassitudine, hyalinum, hyphis dense compactum, non tenuescens; thecium 60–70 μ altitudine; paraphyses 1 μ diametro, capitibus 3.5–4.0 μ, obovoideis vel subsphericis, ad apicem repetito ramosi; asci 52–56 × 18–21 μ, clavati, vaginati; ascosporae octonae, 11–14 × 6–7 μ, ellipsoideae, uniseptatae, hyalinae.

Thallus dwarf-fruticose, in dense pulvinate tufts up to 25 mm. in diameter, 7–8 mm. tall, lobes torulose or flattened and intricately branched so that it is impossible to trace the older branches, cadmium orange to capucine yellow, below paler, capucine buff to pale yellow-orange; cortex 30–50 μ thick, of isodiametric cells 2–5 μ in diameter, covered by a layer of dead cells up to 5 µ thick; algae up to 12 µ, protococcoid, scant, single or in small colonies scattered throughout the thallus; medulla up to 250 µ thick, of strands of thin-walled branched hyphae 2 µ in diameter, loosely interwoven and almost lacking in the center; lower cortex 30–65 µ thick, continuous and identical with the upper cortex. Occasionally foreign algae occur in great patches on the under side, but since they seem to be devoid of hyphae they can scarcely be regarded as true cephalodia.

Apothecia up to 1 mm. in diameter, marginate, concave especially when young, Mars orange to English red; amphithecium 90–100 µ thick, cortex identical and continuous with that of the thallus; algae scattered throughout in small colonies; medulla similar to that of the thallus; parathecium not differentiated; hypothecium 20–30 µ thick, hyaline, denser than the medulla, not tapering much; thecium 60–70 µ tall; paraphyses 1 µ in diameter, tips 3.5–4 µ, more or less racquet-shaped or sometimes almost subspherical, often repeatedly branched near the tips, not darkened; asci 8-spored, 52–56 × 18–21 µ, slender-clavate with a moderate sheath; ascospores 11–14 × 6–7 µ, ellipsoidal, 2-celled, each cell distinct with its own nucleus, hyaline.

On biotite-sericite schist, fine-grained dike, and highly metamorphosed sedimentary rocks.

Marie Byrd Land: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-3,* type; Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-2;* Mt. Stancliff, *P. Siple & S. Corey 72A-1;* Skua Gull Peak, *P. Siple & S. Corey 72W-6, 72W-7, 72W-14.*

Polycauliona **sparsa** Dodge & Baker, sp. nov.
Pl. 54, figs. 281–286.

Type: Marie Byrd Land, Skua Gull Peak, *P. Siple & S. Corey 72W-5.*

Thallus suffruticosus aut herpetiformis super lichenibus muscisque, lobis gracilibus, paullo ramosis, torulosis vel subapplanatis, raro ad 0.5 mm. diametro, coccineus, subtus salmoneo-aurantiacus; cortex 10–15 µ crassitudine, cellulis isodiametricis, exteris obscuris; algae ad 15 µ diametro protococcoideae, sub cortice sparsae aut in strato 20–30 µ crassitudine sub hypothecio; medulla 200–300 µ crassitudine, funiculis hypharum 2–4 µ diametro, ramosarum reticulatim, densius sub apothecio corticeque laxissime loborum centro dispositis; cortex inferior superiori similis.

Apothecia ad 1 mm. diametro, plana convexave, marginata, juventute inflexa, coccinea, sessilia, singula; amphithecium 60–80 μ crassitudine, thallo simile; parathecium circa 20 μ crassitudine, hyphis tenuibus flavis dense compactum; thecium 40–50 μ altitudine; paraphyses 1 μ diametro, moniliformes, ramosi, cellulis brevibus, ovoideis, penultima quam ultima majore, ad 3 μ diametro, epithecium hyalinum, KOH addito coccineum; asci 42–48 × (10–)14–16 μ, obtuse clavati; ascosporae octonae, 12–15 × 6–8 μ, polaribiloculares, cellulis separatis, uninucleatis, ellipsoideae, hyalinae.

Thallus dwarf-fruticose or growing over other lichens and mosses, lobes slender, sparingly branched, torulose or somewhat flattened, rarely reaching 0.5 mm. in width, scarlet, below salmon orange; cortex 10–15 μ thick, of isodiametric cells, the outermost darkened; algae up to 15 μ in diameter, protococcoid, scattered in the thallus below the upper cortex and massed in a layer 20–30 μ thick below the hypothecium; medulla about 200–300 μ thick, of strands of hyphae 2–4 μ in diameter, frequently branched in a loose net, denser below the apothecium; lower cortex identical with the upper cortex.

Apothecia up to 1 mm. in diameter, flattened to convex with a small margin, inrolled when young, scarlet, sessile on the lobes, single and scattered; amphithecium 60–80 μ thick, cortex and medulla continuous with those of the thallus and of the same structure; algae scattered in the medulla; parathecium about 20 μ thick, of hyaline hyphae with fastigiately branched tips; hypothecium 10 μ, yellowish, of compact hyphae; thecium 40–50 μ tall; paraphyses 1 μ in diameter, branched, almost moniliform, cells ovoid, the penultimate usually larger than the ultimate which are up to 3 μ in diameter, epithecium hyaline becoming bright red with KOH; asci 42–48 × (10–)14–16 μ, bluntly clavate, 8-spored; ascospores 12–15 × 6–8 μ, polaribilocular, the cells separate and uninucleate, ellipsoidal to somewhat curved, hyaline. At maturity the spores lie free in the gelified ascus, but when young with a distinct protoplasmic sac within the gelified sheath.

Growing on lichens and mosses and on orthoclase-sericite-siderite schist, and often parasitized by *Thelidium Caloplacae.*

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-5*, type, *72W-6, 72W-14.*

BUELLIACEAE

Thallus crustose to squamose, simple or effigurate, without rhizinae, attached to the substrate by the hyphae of the prothallus or the medulla; cortex variable, evanescent in some species; algae protococcoid; medulla loosely woven, of thin-walled hyphae. Apothecia circular, immersed or sessile, lecideine or lecanorine; paraphyses simple or branched; asci normally 8-spored; spores smoke gray to brown, 2–4-celled or muriform, few-celled by division of one or more middle cells, usually with a thick wall, without a gelified sheath as in Lecideaceae, with which they may be confused. Spermatia short, straight.

KEY TO ANTARCTIC GENERA

- Apothecia lecideine .... BUELLIA
  - Spores 2-celled, occasionally one- or three-celled.
    - Thallus not effigurate .... *Eubuellia*
    - Thallus effigurate .... *Diploicia*
  - Spores 4-celled or few-celled, muriform, not effigurate .... *Diplotomma*
- Apothecia lecanorine .... RINODINA
  - Hypothecium dark-colored; spores polaribilocular .... *Orcularia*
  - Hypothecium hyaline.
    - Spore-wall thick.
      - Lumen of spore round or with rounded angles .... *Eurinodina*
        - Spores 2-celled .... *Pachysporaria*
        - Spores 4-celled .... *Conradia*
      - Lumen of spore cordiform or blunt corniform, hyaline until late .... *Mischoblastia*
    - Spore-wall thin, no isthmus; spores small, 2-celled.
      - Thallus uniform; apothecia immersed .... *Melanaspicilia*
      - Thallus effigurate .... *Beltraminia*

BUELLIA

BUELLIA DeNotaris, Giorn. Bot. Ital. II. 1^1: 195. 1846.

The type species was not designated. Of the three species first treated *B. canescens* (Dicks.) DNtrs. may be eliminated as it belongs in sect. *Diploicia* which is sometimes treated as a separate genus. Of the two remaining in sect. *Eubuellia* Clements & Shear (Gen. Fung. 323. 1931) have chosen *B. parasema* DNtrs.

Thallus crustose, simple, margins sometimes effigurate, seldom squamulose, attached to the substrate by the hyphae of the medulla or prothallus, without true rhizinae; with a fastigiate cortex often evanescent, or more rarely with a pseudoparenchymatous cortex; algae *Protococcus;* medulla of reticulately woven thin-walled hyphae, occasionally sorediate. Apothecia immersed, appressed or sessile, lecideine, black, without algae; hypothecium usually dark or carbonaceous; paraphyses often capitate, epithecium dark; asci usually 8-spored; ascospores brown to black, ellipsoid or elongate, 2–4-celled or slightly muriform from division of the middle cells (in section *Diplotomma)* with a thick wall and without a sheath (distinction from *Rhizocarpon* of the Lecideaceae).

Three sections are commonly recognized, for characters of which see preceding key. This genus contains the largest number of species of any genus found in the Antarctic, thirty-seven having been reported from the Antarctic Archipelago and ten from South Victoria Land, to which we have added twelve new ones from Marie Byrd Land and King Edward VII Land, and one from the Queen Maud Mts. in South Victoria Land.

KEY TO ANTARCTIC SPECIES

- Spores 4-celled to few-celled muriform, not effigurate...............DIPLOTOMMA
  - A single species...*B. Siplei*
- Spores 2-celled, rarely one- or three-celled, not effigurate..............EUBUELLIA
  - Thallus some shade of yellow.
    - Thallus yellowish brown.
      - Spores 17–25 μ...*B. isabellina*
      - Spores 11–17.5 μ.
        - Margin digitate, lacinulate; parathecium 30–40 μ; thecium 70–80 μ... ....*B. radians*
        - Margin confervoid; parathecium thinner; thecium 90–120 μ......... ....*B. olivaceobrunnea*
    - Thallus light yellow.
      - Spores 14–20 μ..*B. modesta*
      - Spores 10–14 μ.
        - Non-assimilative areolae black; apothecium 1 mm.; hypothecium fuscous..*B. adarensis*
        - Non-assimilative areolae absent; apothecium 0.27 mm.; hypothecium hyaline or light brown.................................*B. pallida*
        - Non-assimilative areolae white; apothecium 0.56 mm............*B. grisea*
    - Thallus bright yellow.
      - Spores 15–20 μ..*B. Nelsoni*
      - Spores over 20 μ.
        - Apothecia up to 2 mm. in diameter.........................*B. anisomera*

Apothecia 1 mm. in diameter.
Thallus areolate..*B. cremea*
Thallus granulose to squamulose........................*B. inordinata*
Apothecia up to 0.6 mm. in diameter........................*B. citrella*
Spores up to 16 μ long; areolae yellow.
Tops flat with black margins..............................*B. flavoplana*
Tops rounded, margins not black.
Apothecia up to 0.4 mm. in diameter, assimilative areolae up to 1 mm..*B. superba*
Apothecia up to 0.8 mm.; assimilative areolae up to 0.75 mm...*B. chrysea*
Apothecia up to 1 mm.; assimilative areolae 2–3 mm., 1.5 mm. high; thallus with small black sterile areolae...............*B. variabilis*
Apothecia up to 1.5 mm.; assimilative areolae 2–3 mm., 0.25 mm. high; thallus with black non-assimilative margin, rugose to confervoid...*B. tristis*
Thallus of some other color.
Growing over soil and mosses.
Thallus pale or white; ascospores large........................*B. parasema*
Thallus red-brown or darker; ascospores 11–15 × 4.5–7 μ; hypothecium dark brown..*B. muscicola*
Saxicolous.
Spores more than 30 μ long.
Thallus brownish white; warts 3–4 mm. high............*B. subpedicellata*
Thallus pure white; warts much smaller......................*B. Goudieri*
Spores less than 30 μ long.
Hypothecium hyaline.
Spores more than 20 μ long.
Margin of non-assimilative area not distinct; thallus 1 mm. thick ....*B. conspicua*
Margin of non-assimilative area black; thallus 0.5 mm. thick.... ....*B. melanostola*
Spores less than 20 μ.
Thallus mainly confervoid.
Assimilative areolae white; apothecium 0.6 mm.; spores 9–12 × 5–7 μ....................................*B. stellata*
Assimilative areolae olive brown.
Apothecium 0.25 mm.; spores 12–14 × 8–10 μ...*B. pycnogonoides*
Apothecium 0.33 mm.; spores 9–9.5 × 5.5–6.5 μ...*B. brunnescens*
Thallus of small white separate areolae; spores 13–15 × 8–9 μ ....*B. evanescens*
Thallus of stellate white radiating strands; spores 8–10 × 4–6 μ ....*B. alboradians*
Thallus continuous or nearly so.
Thallus white, light gray or brown, areolate.
Spores 16–20 × 5.5–7 μ............................*B. Russellii*
Spores 11–13(–16) × (8–)9–11 μ.................*B. dimorphota*
Spores 10–15.5 × 5.5–7 μ............................*B. grisea*
Spores 8–9.5 × 4.5–6 μ.............................*B. floccosa*

Thallus and apothecia black.
Assimilative thallus tuberculate and continuous, showing little non-assimilative thallus; spores 10–12 × 6–8 μ.... ....*B. pernigra*
Assimilative thallus scattered, tuberculate; non-assimilative thallus well developed, continuous or reticulate toward the margin; spores 8–10(–13) × 5–6(–7.5) μ...*B. dendritica*
Hypothecium brown.
Margin of non-assimilative thallus white..............*B. latemarginata*
Margin of non-assimilative thallus brownish.
Thallus thick, brown..................................*B. augusta*
Thallus thin, whitish..............................*B. protothallina*
Margin of non-assimilative thallus not as above.
Margin indistinct.
Spores less than 16 μ long.
Thallus thick, maculate.............................*B. frigida*
Thallus thin.
Thallus continuous...............................*B. quercina*
Thallus not continuous, whitish....................*B. albida*
Spores 16–28 μ.
Thallus white.................................*B. imperfecta*
Thallus brownish....................................*B. russa*
Thallus not as above.
Apothecia up to 0.4 mm.........................*B. polychroa*
Apothecia up to 1 mm........................*B. melampoa*
Spores up to 28 μ...............................*B. dichromatina*
Margin distinct.
Margin dendritic.
Thallus whitish.
Spores brown......................................*B. Gainii*
Spores black.
Margin 2–3 mm. broad......................*B. margaritae*
Margin 5–6 mm. broad......................*B. Liouvillei*
Thallus grayish.
Spores black......................................*B. Tuxenii*
Spores brownish.
Hypothecium black....................*B. caesiocinerescens*
Hypothecium brownish.
Thallus up to 0.8 mm. thick....................*B. perlata*
Thallus up to 1 mm. thick................*B. endomelaena*
Margin not dendritic.
Spores over 20 μ long.
Spores black...............................*B. Petermanni*
Spores not black.
Non-assimilative margin very narrow......*B. acarosporoides*
Non-assimilative margin up to 1 mm.........*B. festivissima*
Spores less than 20 μ long.
Thallus up to 0.5 mm. thick.
Apothecia up to 1 mm. in diameter..........*B. actinoloba*

Apothecia up to 0.5 mm. in diameter.........*B. brabantica*
Thallus much thinner.
  Thallus dark gray...........................*B. Charcoti*
  Thallus brownish...........................*B. Joannae*

BUELLIA **Siplei** Dodge & Baker, sp. nov.

Pl. 60, figs. 376–377; pl. 61, figs. 378–380.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-6.*

Thallus inter muscos in solo, inconspicuus, albus vel brunnescens, gelifactus madefactus, mollis, crustosus vel granulosus; cortex superior cellulis fastigiatis, superficie subobscurascente; stratum gonidiale basale, circa 160 μ crassitudine, algis abundantibus parvis, ad 3 μ diametro; medulla 350 μ crassitudine, hyphis hyalinis, circa 2 μ diametro, laxe reticulatimque dispositis, circum algas compactioribus; cortex inferior cortici superiori similis, saepe cum cephalodiis hypogenis Rivulariaceis, ad 150 μ crassitudine sub thallo apotheciisque.

Apothecia ad 1.5 mm. diametro, plerumque circa 0.45 mm. diametro, irregularia, applanata vel concava, marginata, subnitida, grisea vel nigra, rara; parathecium 20–30 μ crassitudine, pseudoparenchymaticum, cellulis ad 7 μ diametro, obscuris pachydermaticisque, in hypothecium mergens; hypothecium ad 25 μ crassitudine, cellulis obscure brunneis reticulatis compactis; thecium ad 50 μ altitudine; paraphyses ad 0.75 μ diametro, graciles, ramosi, gelifacti, apicibus non inflatis, hyalinis; epithecium 8–15 μ crassitudine, gelifactum, obscure brunneum; asci 38–47 × 11–15 μ, elongato-clavati vel maturitate late-clavati, apicibus vaginatis; ascosporae 15–26 × 4–5 μ, ovoideae dein elongatae, 2–8-cellulares, frequenter 4-cellulares, obscure brunneae.

Assimilative areolae over areas of a few mm. among mosses on soil and gravel, inconspicuous, white to brownish, gelified when moist, soft, crustose to granulose; upper cortex represented by scattered fastigiate cells slightly darkened at the outer edges; algal layer basal, about 160 μ thick, cells very numerous, small, up to 3 μ in diameter; medulla 350 μ thick, of loosely reticulate hyaline hyphae about 2 μ in diameter, more compact about the algal cells; basal cortex not morphologically differentiated from the upper cortex, consisting of a few scattered fastigiate cells, sometimes with extensive hypogenous cephalodia of *Rivularia,* up to 150 μ thick, below the thallus and the apothecia.

Apothecia up to 1.5 mm., usually about 0.45 mm. in diameter, irregular, flat to concave, margined, somewhat shining, gray to black, not numerous; parathecium 20–30 μ thick, of large dark thick-walled cells up to 7 μ in diameter, pseudoparenchymatous, extending evenly about the apothecium and merging with the hypothecium below; hypothecium up to 25 μ thick, of small dark brown cells, reticulate, compact, thinning laterally to merge with the parathecium; thecium about 50 μ tall; paraphyses about 0.75 μ in diameter, slender, branching, not much inflated at the tips, closely united in a gel, hyaline, not darkened on the outside; epithecium 8–15 μ, gelified, dark brown; asci 38–47 × 11–15 μ, 8-spored, elongate-clavate, becoming broadly clavate at maturity, gelified sheath prominent over the tip; ascospores 15–26 × 4–5 μ, short-ovoid at first becoming elongate with one end tapering, divided transversely into from 2 to 8 (mostly 4) cells, dark brown.

On soil and sericite-orthoclase schist.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-6*, type; Lichen Peak, *P. Siple & S. Corey 73-7*.

BUELLIA **olivaceobrunnea** Dodge & Baker, sp. nov.
Pl. 58, figs. 340–347.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-15.*

Thallus non assimilans 1–3 × 0.5–2.5 cm., adpressus, marginatus, saepe tenuescens, non elevatus, confervoideus, raro albomaculatus, cellulis emortuis corticalibus, continuus, niger; cortex superior ad 30 μ, cellulis sphericis non angularibus; medulla hyphis reticulatis; stratum basale cellulis sphericis; areolae assimilantes ad 0.5 mm., pustulares aut elongatae, irregulares, angulares applanataeque, raro radiatim diffractae, gregariae, sparsae aut etiam singulae in area centrali, obscure olivaceo-brunneae vel citrino-ravae; cortex superior 10–30 μ, fastigiatus, capitatus, cellulis magnis pachydermaticis in duobus vel tribus stratis evanescentibus; stratum gonidiale 50 μ, cellulis ad 7 μ diametro; medulla 100–150 μ, reticulata; stratum basale 10–30 μ, cellulis sphericis.

Apothecia ad 0.5 mm. diametro, circularia, raro angularia, emarginata, unum vel plura in quaque areola, gregaria vel immersa, sessilia, nigra; cortex medullaque desunt; hypothecium 50–100 μ crassitudine centro, ad margines tenuescens, obscurum, reticulatum, basi subsolido; thecium 90–120 μ crassitudine; paraphyses 2–4 μ, ramosi, apicibus non inflatis, obtusi, cellulis pachydermaticis vaginatis, epithecium 5–8 μ crassitudine, obscurum; asci (50–)70–96 × (14–)18–28 μ, elongati, clavati, vaginati; ascosporae octonae, 13–17.5 × 6–11 μ, uniseptatae, raro aseptatae, obtusae vel longiores et acutae, constrictae, obscurae.

Non-assimilative portions covering areas 1–3 × 0.5–2.5 cm. closely applied to the rock, margin distinct, often thinning out, not raised, confervoid, occasionally with whitish patches of dead cortical cells, usually continuous and making a conspicuous border, black; upper cortex about 30 μ, of spherical cells not angled by pressure but making a compact tissue; medulla of similar cells in a very loose open network; basal layer similar to the upper cortex; assimilative areolae up to 0.50 mm., pustular and circular in outline or irregularly elongate, angular and flattened, sometimes radially cracked, often showing a thin encrusting black layer on the upper surface and in older collections entirely blackened, massed or scattered to single in central portion, dark olive brown to citrine drab; upper cortex 10–30 μ thick, of two or three layers of thick-walled cells which disappear, leaving a palisade of small thin-walled, compact cells without a definite outer zone; algal layer 50 μ thick, cells up to 7 μ in diameter; medulla 100–150 μ, of loose hyphae in a definite reticulate arrangement; basal layer 10–30 μ, similar to the basal layer of the non-assimilative portions.

Apothecia up to 0.5 mm., usually circular in outline, sometimes angled by mutual pressure, without a prominent rim, one to several on an assimilative areola, usually gregarious, sessile or immersed; cortex and medulla absent; parathecium a few differentiated cells merging laterally into the cortex of the thallus; hypothecium 50–100 μ thick at the center, thinning toward the parathecium, dark, of close reticulations, almost solid at the base; thecium 90–120 μ thick; paraphyses 2–4 μ, only slightly inflated at the tips, often much branched, blunt with a dark encrusting layer on the outer surface, cells thick-walled, sheath conspicuous, epithecium 5–8 μ thick, dark; asci (50–)70–96 × (14–)18–28 μ, 8-spored, very elongate-clavate, with well-developed sheath (size is very variable but spores from the same collection are very constant despite this variation); ascospores 13–17.5 × 6–11 μ, 2-celled although occasionally not divided, blunt to more elongate and pointed (variations occur in the same section), constricted at the septum or not, dark.

On coarse-grained pink granite, quartzite, and dark greenish-gray slate.

KING EDWARD VII LAND: Rockefeller Range, Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-15.*

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-7, 72W-15,* type, *72W-16;* Mt. Stancliff, *P. Siple & S. Corey 72A-2.*

BUELLIA **pallida** Dodge & Baker, sp. nov. Pl. 56, figs. 318–321. Type: Marie Byrd Land, Edsel Ford Range, Haines Mts., *P. Siple & F. A. Wade H-3.*

Areolae assimilantes sparsae vel gregariae, ad 2–5 mm. diametro, irregulares, subpulvinatae, ad 0.25 mm. longitudine, dilute luteae vel albidae, nigro-marginatae, cortex ad 10 μ crassitudine, hyphis brunneis magnis; algae sparsae; medulla 120–150 μ crassitudine, hyphis laxe implexis; stratum basale circa 10 μ crassitudine, non bene evolutum obscurius compactiusque.

Apothecia circa 0.27 mm. diametro, sessilia, applanata vel concava, marginata, rara, nigra, carbonacea; cortex 18–20 μ crassitudine, niger, pseudoparenchymaticus; parathecium non bene evolutum; hypothecium 40–50 μ, tenuescens et cum cortice concrescens, hyalinum vel dilute brunnescens; thecium circa 50–55 μ altitudine; paraphyses 1–1.5 μ, capitibus circa 3 μ diametro, nigrescentibus, ramosi vel non ramosi, epithecium circa 5 μ, obscurum; asci 30–40 × 13–20 μ, late clavati; ascosporae (9–)10–13 × 5–6.5 μ, octonae, uniseptatae, raro septo constrictae, obtusae, obscurae.

Non-assimilative portions of thallus not developed; assimilative areolae scattered or gregarious, covering areas up to 2–5 mm., irregular in outline, somewhat pulvinate, up to 0.25 mm. long, pale yellowish to white, usually black-margined; cortex of coarse dark hyphae up to 10 μ thick; medulla of loose spongy tissue, 120–150 μ; algae scattered; basal layer about 10 μ thick, not much differentiated from the medulla but slightly darker and more compact.

Apothecia about 0.27 mm. in diameter, circular, sessile, flat or concave, margined, black, carbonaceous, rare; cortex 18–20 μ thick, black, pseudoparenchymatous; medulla about 35 μ thick above the algae which gradually die out in the center under the apothecium and persist along the margin, of the same texture as that of the thallus; parathecium not well differentiated; hypothecium 40–50 μ thick in the center, tapering laterally until it merges with the cortex, hyaline or very pale brown, of compact periclinal hyphae; thecium about 50–55 μ tall; paraphyses 1–1.5 μ, expanding to heads about 3 μ in diameter, branched or unbranched, epithecium dark brown, about 5 μ thick; asci 30–40 × 13–20 μ, 8-spored, short, broadly clavate, shortening with maturity as the contents swell; ascospores (9–)10–13 × 5–6.5 μ, 2-celled, rarely constricted at the septum, mostly blunt, dark brown.

On pitted sericite schist, brownish with iron.

MARIE BYRD LAND: Edsel Ford Range, Haines Mts., *P. Siple & F. A. Wade H-3*, type.

BUELLIA **grisea** Dodge & Baker, sp. nov. Pl. 59, figs. 354–357. Type: Marie Byrd Land, Edsel Ford Range, Haines Mts., *P. Siple & F. A. Wade H-1.*

Thallus non assimilans ad 1.5 cm. diametro, radiatus, saxicola, lobatus, griseus vel albus, marginibus nigris; cortex fastigiatus, cellulis brunneis, insuper evanescens; medulla laxa, cellulis irregularibus; stratum basale pseudoparenchymaticum, obscurum; areolae assimilantes lobatae, ad 1.75 mm. diametro, irregulares, dichotome ramosae, marginibus impendentibus, radiatim diffractae, ad centrum thalli diffusae sparsaeque, albae, lutescentes vel griseae, marginibus dilutioribus; cortex fastigiatus, in apicibus areolarum evanescens; stratum gonidiale 60 μ, coloniis 14–16 μ diametro, sparsis, protococcoideis; medulla 35–40 μ crassitudine, hyphis laxe implexis; stratum basale non bene evolutum, cellulis obscurioribus.

Apothecia ad 0.56 mm. diametro, irregulariter hemispherica, convexa, sessilia singulaque quoque in areolis, sparsa, nigra, carbonacea; cortex cellulis pachydermaticis, pseudoparenchymaticus; hypothecium ad 50 μ crassitudine, non tenuescens; parathecium deest; thecium 60–70 μ; paraphyses 1–1.5 μ, apicibus ad 2 μ, nigro-incrustatis; asci 36–46 × 14–16 μ, elongato-clavati, vaginati; ascosporae octonae, uniseptatae, 10–13.5 × 5.5–7 μ, brunneae.

Non-assimilative thallus up to 1.5 cm. in diameter, radiate, saxicolous, lobed, gray to white, margins black; cortex fastigiate, of dark cells thinning out over the tops of the lobes; medulla of loose irregular hyphae; basal layer represented by scattered dark isodiametric cells; assimilative thallus of distinct lobes up to 1.75 mm. across, irregular, often dichotomously branched, overhanging at the margins, radiately cracked, becoming diffused and scattered toward the center, white to yellowish or gray, margins usually lighter in color; cortex fastigiate, breaking away over the tops of the areolae; algal layer 60 μ, colonies 14–16 μ, scattered, protococcoid; medulla 35–40 μ thick, of loosely woven hyphae; basal layer not well developed, occasionally represented by a few dark cells; often sterile, but thalline characters are sufficient for identification.

Apothecia up to 0.56 mm. in diameter, irregularly hemispheric, convex, sessile on the areolae, black, carbonaceous; cortex of thick-walled pseudoparenchyma; hypothecium up to

50 μ thick, not thinning; parathecium only a few cells or not differentiated; thecium 60–70 μ; paraphyses 1–1.5 μ, slightly expanded up to 2 μ at the tips with heavy black incrustations at the outer edges, unbranched or branched, epithecium about 10 μ, dark; asci 36–46 × 14–16 μ, elongate-clavate with a sheath, 8-spored; ascospores 10–13.5 × 5.5–7 μ, with or without a constriction at the septum, blunt or slightly tapering.

On sericite schist, biotite-sericite, orthoclase-sericite schist, brownish with iron.

MARIE BYRD LAND: Haines Mts., *P. Siple & F. A. Wade H-1*, type, *H-2;* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-5;* Garland Hershey Ridge, *P. Siple & S. Corey 5-2.*

BUELLIA FLAVOPLANA Darbishire, Brit. Antarct. [Terra Nova] Exp. Bot. **3**: 38. 1923. Pl. 55, figs. 297–302; pl. 65, fig. 424.

Illustrations: Darbishire, *Ibid.* p. 38, *f. 6; pl. 1, f. 3.*

Type: South Victoria Land, Cape Adare, British Antarctic [Terra Nova] Expedition in British Museum, not seen.

Thallus closely applied to the rock substratum, covering areas 0.5–2.5 cm. in diameter; non-assimilative portion carbonaceous, black, margin determinate, sometimes as much as 0.9 mm. high or thinning out until the edges are distinctly confervoid, forming a continuous layer of different levels but frequently separating into strands in the interior, the pillars flattened, convex or concave, even conical, 50–500 μ in diameter, 90–220 μ high, often capped with dead, white cortical cells, giving the whole area a grayish color in a more or less definite reticulate pattern in contrast to the pure black margin; upper cortex 20–75 μ thick, of the fastigiate type, the capitate hyphal tips forming a dark pseudoparenchymatous layer two or three cells deep, merging gradually with the medulla; over the pillars the cortical cells die, become hyaline and no longer staining with the usual dyes; medulla of loosely woven hyaline hyphae 2–3 μ in diameter; assimilative areolae 0.65–1.35 mm. in diameter or elongate and up to 1.6 mm. long, those sectioned 290–1100 μ in diameter, 90–400 μ tall, chartreuse yellow to whitish, the surface decorticate above, hence slightly floccose, flattened, scattered or so closely associated that they become angular by mutual pressure; upper cortex continuous with that of the non-assimilative portion, extending only a short way over the edges of the areolae (when young the cortical rim is so pronounced that the areolae appear immersed in the thallus and when an assimilative areola is secondarily divided by cracks, the cortex is completely lacking in the cracks); algal layer 30–40 μ thick, cells protococcoid, mostly in vertical rows, spherical, 7–8 μ in diameter, sheaths up to 14 μ; medulla of loosely associated hyphae continuous with that of the non-assimilative portion, often compactly united in vertical columns which penetrate the algal layer; basal layer 10–15 μ thick, less distinct than the upper cortex, of a few rows of dark cells densely packed.

Apothecia scattered or gregarious, convex to irregularly spherical on separate pillars, sometimes almost stalked, usually sessile to subsessile, 0.22–1.3 mm. in diameter, commonly about 0.67 mm., convex when young with an equatorial fringe of dead, white cortical cells, becoming flattened, usually with a conspicuous margin, sometimes emarginate; cortex and medulla continuous with those of the thallus and of the same texture; parathecium not differentiated; hypothecium of dark closely associated cells, about 40 μ thick at the center, 25 μ at the sides, and disappearing upwards; thecium 60–90 μ thick; paraphyses 2–4 μ in diameter, branched or straight, not capitate, ending in a dark brown epithecial gel 8–10 μ thick, cells short, thick-walled, the whole gelified; asci elongate, broadly clavate, with a prominent gelified sheath, 8-spored, 45–55 × 18–20 μ; ascospores dark, 2-celled with blunt ends, slightly constricted at the septum, sometimes undivided but approximately the same size, 10–16 × 7–9 μ, one cell of the spore sometimes exceeding the other in size.

The assimilative areolae are easily the most conspicuous part of this lichen for they contrast strikingly with the black thallus. Darbishire reported no apothecia exceeding 1 mm., but several larger ones were found in these collections.

On biotite-sericite schist.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-3, DW-5.*

BUELLIA **chrysea** Dodge & Baker, sp. nov.

Pl. 56, figs. 308–311, 316–317.

Type: Marie Byrd Land. Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7.*

Thallus appressus, radians 2–4 mm. diametro, pars non assimilans ad 150 μ crassitudine, nigra; cortex medullaque non bene evoluta, extus nigra, intus hyalina, continua vel dissecta reticulataque juventute; areolae assimilantes ad 0.75 mm. diametro, pustulares, floccosae, irregulares, ''marguerite yellow,'' angulatae, sparsae vel gregariae; cortex fastigiatus, cellulis magnis brunneis, in superficie evanescens et amorphus; stratum gonidiale coloniis sparsis in media vel in basi medullae; medulla hyphis tenuibus laxe reticulatimque implexis, sub apotheciis hyphis brunneis majoribus; stratum basale cellulis parvis brunneis compactius sed plus minusve reticulatum, ad 15 μ crassitudine.

Apothecia ad 0.8 mm. diametro, spherica convexave, marginibus subcrenulatis, sessilia, nigra; cortex 10–15 μ crassitudine, cellulis magnis fastigiatis; hypothecium ad 150 μ crassitudine, obscurissimum, cellulis magnis brunneis reticulatim dispositis; thecium 90–100 μ crassitudine; paraphyses 1–2 μ crassitudine, capitibus ad 6 μ diametro, ramosi, apicibus obscuris, epithecium 10–18 μ, nigrum, rugosum; asci 45–65 × 15–18 μ, clavati, basi longa attenuataque; ascosporae 10–12 × 5.5–7 μ, octonae, uniseptatae, obtusae vel subacutae, brunneae.

Thallus closely attached, spreading more or less radiately over areas of 2–4 mm.; non-assimilative portion up to 150 μ thick, black, dull, cortex and medulla not morphologically differentiated but external layers black, hyaline within, continuous or dissected and reticulate especially in younger stages; assimilative areolae up to 0.75 mm. in diameter, pustular, floccose, irregular, marguerite yellow, angled by pressure when close together, scattered or gregarious; upper cortex not well defined except at the margins of the areolae, fastigiate, of large dark cells not covering the surface of the areolae which is amorphous; algal colonies scattered through the middle and basal portion of the medulla, of reticulate loosely woven hyphae (below the apothecia darker and coarse); basal layer of slightly darkened cells, small, rather compact although more or less reticulate, up to 15 μ.

Apothecia up to 0.8 mm., spherical, convex, with a distinct margin sometimes slightly crenulate, sessile, black, dull; cortex 10–15 μ thick, of large fastigiate cells; hypothecium up to 150 μ thick, very dark, of coarse brown cells in a close reticulum; thecium 90–100 μ tall; paraphyses 1–2 μ in diameter, expanding to heads up to 6 µ in diameter, usually branched, the outer surfaces of the apices darkened, epithecium 10–18 µ, black and rugose; asci 45–65 × 15–18 µ, 8-spored, especially long and slender, clavate, and expanded above, the base remaining attenuate; ascospores 10–12 × 5.5–7 µ, 2-celled, not always constricted at the septum, blunt to somewhat pointed, dark.

On coarse-grained granite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7*, type.

BUELLIA **muscicola** Dodge & Baker, sp. nov.

Pl. 59, figs. 348–353.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-2, HW-10.*

Thallus non assimilans 1.75 × 0.7 cm., conspicuus, tenuiter dendritice ramosus, obscure rufo-brunneus vel niger, marginibus funiculorum principalium asperatis, ramis brevibus, cellulis obscuris, irregularibus, cortice medullaque non evolutis sed cellulis interis nonnumquam hyalinis; areolae assimilantes ad 0.33 mm., pallidae vel rufo-brunneae, gelifactae, sparsae vel gregariae ad confluentiam funiculorum; cortex mox evanescens; stratum gonidiale in medio thalli, ad 60 µ crassitudine, cellulis 4 µ diametro; medulla hyphis laxe implicatis; stratum basale non evolutum; bulbilli ad 75 µ diametro, spherici, obscuri, numerosi, sparsi vel gregarii, cellulis brunneis pseudoparenchymaticis.

Apothecia ad 0.57 mm. diametro, applanata vel subspherica, nonnumquam marginata, convexa, sessilia vel substipitata, sparsa vel gregaria, nigra, carbonacea; cortex ad 20 µ, bene evolutus, cellulis magnis brunneis; hypothecium 20–50 µ, obscure brunneum; thecium ad 80 µ altitudine; paraphyses 1.5–2 µ, ramosi, capitati, 7–8 capitibus in quoque paraphyse, cellulis 5 µ diametro, brunneis, epithecium ad 10 µ, obscurum, asperum; asci 31–50(–57) × 14–17 µ, clavati, vaginati; ascosporae octonae, 11–15(–17) × 4.5–7 µ, uniseptatae, non constrictae, acutae, distichae juventute, dein irregulares.

Non-assimilative portion 1.75 × 0.7 cm., on rocks or soil among mosses, conspicuous but very slender, branched, spreading, dark reddish brown to black, the edges of the main strands roughened by short side branches, of dark irregular cells; cortex and medulla not differentiated, but the inner cells sometimes hyaline; the assimilative areolae up to 0.33 mm., pale to red brown, pustular, gelified, especially abundant and prominent at the confluence of the non-assimilative branches, gregarious or scattered; cortex soon evanescent; algal layer protococcoid, about 60 μ thick in the middle of the thallus, cells about 4 μ in diameter; medulla of loosely woven hyphae somewhat more developed and more compact under the apothecia; lower cortex not differentiated; asexual reproduction on the non-assimilative portions of the thallus by bulbils up to 75 μ in diameter, spherical, dark, numerous, scattered or in groups, pseudoparenchymatous, of dark cells.

Apothecia up to 0.57 mm. in diameter, flattened to almost spherical, sometimes marginate, usually convex, sessile to substipitate, scattered or gregarious, black, carbonaceous; cortex up to 20 μ thick, well developed, of large dark cells; hypothecium 20–50 μ, dark brown, parathecium not differentiated although a few cells can be traced from the margin of the hypothecium to the cortex; thecium up to 80 μ; paraphyses 1.5–2 μ, much branched, the larger expanded, heads arranged in a group of 7–8 suggesting a candelabrum, individual heads about 5 μ in diameter, the walls darkened with a brown cap, epithecium up to 10 μ, dark, rough; asci 31–50(–57) × 14–17 μ, 8-spored, clavate, with a gelified sheath; ascospores 11–15(–17) × 4.5–7 μ, 2-celled, not constricted, pointed, nearly distichous when young, irregularly distributed at maturity.

In our preliminary study of this material, we separated that from Marie Byrd Land as a distinct species, since it differs in longer, narrower asci in all stages of development and in slightly larger spores with greater development of the non-assimilative portions; but without a more precise knowledge of the range of variation from a study of more material than is available, we are inclined to regard them as conspecific.

On soil, quartz crystals, and sericite-orthoclase schist.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-2, HW-7, HW-10,* type.

MARIE BYRD LAND: Edsel Ford Range, Haines Mts., *P. Siple & F. A. Wade H-3;* Skua Gull Peak, *P. Siple & S. Corey 72W-9, 72W-13;* Lichen Peak, *P. Siple & S. Corey 73-1.*

BUELLIA **stellata** Dodge & Baker, sp. nov.

Pl. 55, fig. 303; pl. 56, figs. 304–307.

Type: Marie Byrd Land, Edsel Ford Range, Haines Mts., *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-3.*

Thallus parvus, appressus, saxicola; pars non assimilans radians ex partibus assimilantibus vel apotheciis, funiculosa, cellulis nigris vel in funiculis magis evolutis etiam cellulis medullaribus laxis; areolae assimilantes ad 0.33 mm., hemisphericae vel elongatae, applanatae, singulae vel binae ternaeve, albae vel sordidae, lateribus nigrescentibus per extensionem cellularum corticarum nigrarum ex funiculis; cortex ad 5 μ crassitudine, cellulis brunneis nigrisve, insuper strato cellularum hyalinarum emortuarum tectus; stratum gonidiale ad 40 μ crassitudine, cellulis in coloniis plus minusve sphericis, subangularibus, 4–6 μ diametro; medulla circa 60 μ crassitudine, spongiosa, hyphis verticalibus laxissime intertextis; latera stratumque basale, cellulis plus minusve isodiametricis, insuper in cortice mergentibus.

Apothecia ad 0.6 mm. diametro, circularia, applanata vel subdepressa, submarginata, sessilia vel in areolas assimilantes immersa, omnino areolas tegentia aut saepe annulum album equatorialem reliquentia, singula, nigra, carbonacea; cortex medullaque non evoluta; hypothecium hyalinum vel subbrunneum, 15–22 μ crassitudine, lateraliter tenuescens; thecium 50–70 μ altitudine; paraphyses 1–1.5 μ, apicibus 1.5–2.5 μ diametro, recti vel ramosi ad apices, epithecium 5–7 μ crassitudine, obscurum, KOH viridescens; asci 36–46 × 12–16.5 μ, obtuse clavati; ascosporae octonae, 9–12 × 5–7 μ, obscure brunneae, obtusae, uniseptatae, ad septum constrictae.

Thallus very small and firmly attached to rock; non-assimilative portion dull black, thinly effused, radiating in a stellate pattern from either assimilative areolae or apothecia, composed of simple strands of black cells, or in thicker better-developed areas with loose medullar cells in addition; assimilative areolae up to 0.33 mm., subhemispherical to elongate, flattened, usually single or two or three in a group, white or dingy, sides more or less blackened by the extension of the black cortical cells from the non-assimilative regions; upper cortex about 5 μ thick, sometimes of dark brown or black fastigiate cells, above which is frequently a layer of dead colorless cells; algal layer up to 40 μ thick, cells arranged in more or less spherical colonies, somewhat angular, 4–6 μ in diameter; medulla about 60 μ thick, spongy, of loosely woven hyphae predominantly vertical; sides and basal layer of dark more or less isodiametric cells merging into the fastigiate cortex above.

Apothecia up to 0.6 mm., circular in outline, flattened or slightly depressed with a slight rim, sessile upon or sunk in the assimilative areolae, usually covering them completely although often leaving an equatorial white rim, usually single, black, carbonaceous; cortex and medulla not developed; hypo-

thecium hyaline or faintly tinged with pale brown, 15–22 μ thick, thinning laterally; thecium 50–70 μ thick; paraphyses 1–1.5 μ in diameter, expanding to 1.5–2.5 μ at the tips, straight or rarely branched near the tips, the ends sometimes darkened by a heavier encrusting layer on the outer surfaces, epithecium 5–7 μ thick, dark, giving a faint greenish reaction with KOH; asci 36–46 × 12–16.5 μ, bluntly clavate, 8-spored; ascospores 9–12 × 5–7 μ, dark brown, two-celled, blunt, somewhat constricted at the septum.

On coarse-grained gray granite, granodiorite, sericite-orthoclase schist, biotite-sericite, and orthoclase-sericite-siderite schist.

MARIE BYRD LAND: Edsel Ford Range, Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-3*, type, *DW-5*; Haines Mts., *P. Siple & F. A. Wade H-2*; Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-7*; Chester Mts., *P. Siple & S. Corey 97A-4*; Lichen Peak, *P. Siple & S. Corey 73*.

BUELLIA **brunnescens** Dodge & Baker, sp. nov.
Pl. 56, figs. 312–315.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1*.

Thallus non assimilans tenuissimus, stellatus, niger vel obscure brunneus, cellulis internis verticalibus laxe implexis, exteris isodiametricis; areolae assimilantes ad 0.45 mm. diametro, ellipsoideae subsphericaeve subapplanataeque, sparsae, olivaceo-brunneae vel sordidae vel etiam obscurissimae; cortex superior super stratum gonidiale hyalinus, strato singulo cellularum isodiametricarum, lateralis niger, uno vel pluribus stratis cellularum isodiametricarum; stratum gonidiale protococcoideum, ad 30 μ crassitudine, coloniis subsphericis et cellulis singulis; medulla 100–120 μ, irregulariter laxe contexta; stratum basale 20–30 μ crassitudine, obscurum, pseudoparenchymaticum.

Apothecia ad 0.33 mm., subspherica, applanata, sessilia, immersa, rare concava vel marginata, singula, nigra; cortex, medulla paratheciumque desunt; hypothecium 5–8 μ crassitudine, hyalinum vel subbrunneum; thecium 50–65 μ altitudine; paraphyses 1–1.5 μ, ramosi vel non ramosi, non inflati, apicibus callosis, epithecium circa 5 μ crassitudine; asci 43–48 × 12–14 μ, elongati, clavati, vaginati; ascosporae octonae, 9–9.5 × 5.5–6.5 μ, uniseptatae, subconstrictae, obtusae, obscuriores.

Thallus extremely delicate, of very fine straight threads spreading from assimilative areolae or apothecia, black or dark brown, not differentiated into cortex and medulla, the internal cells dark, in a more or less vertical, loosely woven tissue, the outer cells pseudoparenchymatous; assimilative areolae up to 0.45 mm. in diameter, ellipsoidal or subspherical, pustular or more or less flattened, scattered, olive brown or dingy, sometimes very dark; cortex hyaline over algal zone, of one layer of pseudoparenchymatous cells, lateral cortex of one or more layers of pseudoparenchymatous cells; algal layer protococcoid, up to 30 µ thick, of subspherical colonies and single cells; medulla 100–120 µ, irregularly and loosely woven; basal layer 20–30 µ thick, of dark isodiametric cells.

Apothecia up to 0.33 mm., sessile to immersed, subspherical, flattened above, occasionally concave, marginate, mostly single, black; cortex, medulla, and parathecium not differentiated; hypothecium 5–8 µ thick, scant, hyaline or faintly brownish, not thinning; thecium 50–65 µ tall; paraphyses 1–1.5 µ at the tip, slender, scarcely inflated, branched or straight, tips with a small cap, epithecium about 5 µ thick; asci 43–48 × 12–14 µ, elongate-clavate with a prominent sheath, 8-spored; spores 9–9.5 × 5.5–6.5 µ, 2-celled, slightly constricted at the septum, rather blunt, dark.

On coarse-grained granite.

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1*, type, *R-2*.

BUELLIA **alboradians** Dodge & Baker, sp. nov.
Pl. 56, fig. 322; pl. 57, figs. 323–326.

Type: Marie Byrd Land, Edsel Ford Range, Haines Mts., *P. Siple & F. A. Wade H-1.*

Thallus stellatus, parvus, gregarius in areis ad 2 cm. diametro; areolae assimilantes ad 0.33 mm., albae, floccosae, diffractae, nigro-marginatae, angulares, irregulares, applanatae, parviores ad marginem thalli, ultimis in funiculos tenues reticulatos mergentibus; cortex superior 6–7 µ crassitudine, capitati-fastigiatus, cellulis sphericis, brunneis, 3–4 µ diametro, evanescens aut degenerans; stratum gonidiale 40–50 µ, coloniis sphericis ad 15 µ, sparsis, vaginatis, cellulis ad 7 µ; medulla hyphis laxe implicatis; stratum basale compactius, non bene evolutum, raro cellulis nigris sparsis.

Apothecia ad 0.5 mm., irregulariter hemispherica aut applanato-patellaeformia, raro concava, emarginata, nigra, sessilia, sparsa; cortex niger, ad 15 µ crassitudine, pseudoparenchymaticus; medulla paullum evoluta; hypothecium 40–60 µ, hyalinum aut subluteum, hyphis periclinalibus dense contextum, ad marginem tenuescens; paraphyses 1–3 µ, capitibus ad 5 µ diametro, ramosi, juniores non ramosi, apicibus gelifactis, epithecium 8–15 μ crassitudine, obscurius; asci 36–50 × 13–18 μ, late clavati, vaginati; ascosporae octonae, 8–10(–12) × 4–6(–8) μ, uniseptatae, non constrictae.

Non-assimilative portions of thallus small black confervoid strands; assimilative areolae up to 0.33 mm., radiating in a stellate pattern over small areas of a few mm., or scattered, the entire area not exceeding 2 cm. in diameter, white, rather floccose, crackled, edged with black toward the base, the individual areolae angular, irregular, flattening and diminishing in size at the edges where the marginal segments pass into thin black strands, reticulate or trailing; upper cortex 6–7 μ thick, capitate-fastigiate, cells spherical, 3–4 μ in diameter, disappearing over the tops of the assimilative areolae; algal layer 40–50 μ, of spherical colonies up to 15 μ in diameter, sparingly scattered with broad strands of medullary tissue between, cells up to 7 μ in diameter, with broad sheaths; medulla of loosely woven hyphae; basal layer more compact but not differentiated, rarely with scattered black cells.

Apothecia up to 0.5 mm. in diameter, irregularly hemispheric or more flattened saucer-shaped, rarely concave, without a distinct rim, black, sessile, scattered; cortex black, up to 15 μ thick, pseudoparenchymatous; medulla slightly developed; parathecium not differentiated; hypothecium 40–60 μ thick, hyaline or faintly yellow, of densely woven periclinal hyphae thinning toward the margin; paraphyses 1–3 μ, expanding to heads up to 5 μ in diameter, branched, or unbranched especially when young, tips with thick gelified heads, darker at the outer edges, epithecium 8–15 μ thick; asci 36–50 × 13–18 μ, broadly clavate with a conspicuous sheath, 8-spored; ascospores 8–10(–12) × 4–6(–8) μ, 2-celled, only slightly if at all constricted at the septum, dark, one cell sometimes less blunt than the other, or sometimes non-septate although the spore is as large as the divided spores.

On sericite schist and sericite-orthoclase schist, brownish with iron.

MARIE BYRD LAND: Edsel Ford Range, Haines Mts., *P. Siple & F. A. Wade H-1*, type, *H-2, H-3*; Lichen Peak, *P. Siple & S. Corey 73-10*.

BUELLIA **Russellii** Dodge & Baker, sp. nov.

Pl. 60, figs. 370–375.

Type: South Victoria Land, Queen Maud Mts., Durham Mt. at northeast portal of Thorne Glacier, *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-6(6)*.

Thallus 1–2 cm. diametro, continuus, tenuis, gelifactus madefactus, granulosus vel subareolatus, albus; cortex deest, superficies paucis cellulis obscurioribus pachydermaticisque aut strato tenui 5–10 μ crassitudine cellularum emortuarum tectus; stratum gonidiale paucis coloniis in parte superiore thalli sparsis, cellulis ad 15 μ diametro; medulla ad 350 μ crassitudine, hyphis ad 4 μ diametro, ramosis, laxe reticulatimque dispositis; stratum basale non evolutum.

Apothecia 0.25 mm. diametro, sessilia, pauca, sparsa, convexa, emarginata, nigra, carbonacea; parathecium non evolutum; hypothecium circa 20 μ crassitudine, hyalinum, compactum; thecium 50–55 μ altitudine; paraphyses 1 μ diametro, capitibus brunneis, ad 4 μ diametro, ad apices ramosi, septati, vaginati, epithecium 5–8 μ, obscurum; asci 55–57 × 18–20 μ, elongati, clavati, maturitate latiores, vagina non prominens; ascosporae octonae, 16–20 × 5.5–7.0 μ, bicellulares, ad septa non constrictae, ellipsoideae vel naviculares vel subcurvatae, obscure brunneae, juventute duobus cellulis sporae isthmo angusto conjunctis.

Non-assimilative portions absent; assimilative portion 1–2 cm. in diameter, continuous, thin, gelified when moist, surface uneven, rather granulose to somewhat areolate, white; upper cortex lacking, the outer surface with occasional darker and heavier-walled cells or with a thin layer of dead cells, 5–10 μ thick; algal layer restricted to a few colonies in the upper parts of the thallus, cells up to 15 μ in diameter; medulla up to 350 μ thick, of freely branched hyphae 4 μ in diameter, loosely and reticulately arranged; lower cortex not differentiated, although the hyphae are sometimes more densely arranged in the surface regions as well as about the algae.

Apothecia small, up to 0.25 mm. in diameter, sessile, few, scattered, convex without a margin, black, carbonaceous; parathecium not differentiated; hypothecium about 20 μ thick, hyaline, not differentiated from the medulla beyond its greater compactness, laterally merging with the margin; thecium 50–55 μ high; paraphyses 1 μ in diameter, expanding to large dark brown heads 4 μ or more in diameter, freely branched near the tips, septate, with a gelified sheath, epithecium 5–8 μ, dark; asci 55–57 × 18–20 μ, 8-spored, elongate-clavate, more broadly so at maturity when distended by spores, sheath not especially prominent, although appearing in younger stages than in other species; ascospores 16–20 × 5.5–7 μ, 2-celled, not constricted at the septum, ellipsoidal and navicular or slightly curved, dark brown. In young spores a narrow canal can often be seen connecting the two cells.

On white quartz crystals and dark brownish gray schist.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-11.*

SOUTH VICTORIA LAND: Queen Maud Mts., Durham Mt. at northeast portal of Thorne Glacier, *Q. A. Blackburn, R. S. Russell Jr. & S. D. L. Paine QM-6(6)*, type.

BUELLIA **floccosa** Dodge & Baker, sp. nov.

Pl. 57, figs. 333–334; pl. 58, figs. 336–339.

Type: Marie Byrd Land, Haines Mts., *P. Siple & F. A. Wade H-2.*

Areolae assimilantes abundantes super areas ad 1.5 cm. diametro, appressae, albae vel cremeae, plus minusve floccosae, diffractae, irregulares, marginibus tenuescentibus, subfimbriatis; cortex 15 μ crassitudine, capitati-fastigiatus, cellulis sphericis pachydermaticis brunneis, mox evanescens; stratum gonidiale coloniis paucis sub cortice sparsis, ad 20 μ diametro, non continuum; medulla 100–200 μ crassitudine, funiculis tenuissimis verticalibus ramosisque; stratum basale non bene evolutum, cortici superiori subsimile.

Apothecia ad 0.3 mm. diametro, plerumque multo parviora, convexa vel subdepressa, raro marginata, circularia, applanata, sparsa vel singula, immersa, nigra; parathecium deest; hypothecium ad 45 μ crassitudine, ad marginem tenuescens, hyalinum, hyphis periclinalibus; thecium ad 40 μ; paraphyses 1 μ, capitibus 2–4 μ, ramosi, epithecum circa 8 μ, obscurum; asci 34–40 × 12.5–17 μ, clavati, vaginati; ascosporae 8–9.5 × 4.5–6 μ, octonae, uniseptatae raro non-septatae, subconstricti, obtusae, obscurae.

Non-assimilative portion not differentiated; assimilative areolae abundant over areas up to 1.5 cm., closely attached to the rock, pure white to cream color, more or less floccose, cracked, irregular, margin thinning out, becoming fimbriate in places; cortex 15 μ thick, capitate-fastigiate, of spherical thick-walled yellow-brown cells; algae protococcoid, in small colonies up to 20 μ in diameter just below the cortex, scant and scattered; medulla 100–200 μ thick, of extremely delicate strands of fine hyphae more or less vertical and branching; basal layer not well developed, similar to the upper cortex.

Apothecia up to 0.3 mm. in diameter but usually much smaller, convex to slightly depressed, occasionally with a margin, circular, scattered or single, immersed, dull to shiny; parathecium absent; hypothecium up to 45 μ thick in the center, thinning laterally and merging with the thalline cortex, hyaline, of deeply staining periclinal hyphae; thecium about 40 μ tall; paraphyses 1 μ in diameter, expanding to inflated tips 2–4 μ, usually repeatedly branched, rarely unbranched, epithecium about 8 μ thick, dark; asci 8-spored, 34–40 × 12.5–17 μ, clavate, with a gelified sheath; ascospores 8–9.5 × 4.5–6 μ, 2-celled, rarely undivided, slightly constricted, small, blunt and dark.

On sericite schist, brownish with iron.

MARIE BYRD LAND: Haines Mts., *P. Siple & F. A. Wade H-2*, type, *H-1*.

BUELLIA **dendritica** Dodge & Baker, sp. nov.
Pl. 59, figs. 358–362; pl. 60, figs. 363–364.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-18*.

Thallus 5–8 mm. diametro; pars non assimilans ad 50 μ crassitudine, appressa, saxicola, plus minusve continua vel reticulata, marginibus fimbriatis vel dendriticis, nonnumquam paucis funiculis rugosis, nigris; cortex cellulis magnis nigris; medulla non bene evoluta, cellulis hyalinis; stratum basale a cortice non distinctum; areolae assimilantes ad 0.6 mm., circulares vel elongatae, obscure olivaceo-brunneae vel nigrae maturitate, dilutiores juventute, plus minusve pustulares, paucae, sparsae; cortex ad 12 μ crassitudine, cellulis fastigiatis, continuus insuper, cum strato cellularum emortuarum ad 15 μ crassitudine; algae protococcoideae, abundanter per areolas distributae; medulla 50 μ plusve crassitudine, hyphis magnis reticulatim implexis; stratum basale 10–15 μ, pseudoparenchymaticum, brunneum. Apothecia ad 0.33 mm. diametro, subspherica vel applanata, nonnumquam marginibus cellularum albidarum, singula, totam areolam tegentia, nigra, carbonacea; cortex 15 μ crassitudine, cellulis magnis pachydermaticis, cum cortice areolae continuus; hypothecium 20 μ crassitudine, non tenuescens, cellulis leptodermaticis compactum, hyalinum vel dilute brunneum; thecium ad 110 μ altitudine; paraphyses 1 μ, ramosi, capitibus 3 μ, epithecium 10 μ, rugosum, KOH virescens; asci 35–53 × 13–18 μ, elongati, clavati, breviores et crassiores maturitate; sporae octonae (raro senae, quaternae, vel binae, dein sporae majores), 8–10(–13) × 5–6(–7.5) μ, uniseptatae, subconstrictae, subacutae vel obtusae, brunneae.

Thallus covering areas 5–8 mm. in diameter, closely attached to the rock; non-assimilative areas 50 μ thick, more or less continuous but sometimes rather open-reticulate, margins fimbriate or dendritic, or sometimes of only a few rugose strands, black; cortex of large dark cells a few rows in extent; medulla not differentiated morphologically but composed of a looser arrangement of hyaline cells; basal layer not distinct from the upper cortex; assimilative areolae up to 0.6 mm., circular to elongate, dark olive-brown to black at maturity, much lighter when young, more or less pustular, few and scattered; cortex up to 12 μ thick, well developed, of large fastigiate cells continuous over the top, the outer surface with an extensive layer of dead cells up to 15 μ thick; algae abundant, scattered throughout the areolae; medulla 50 μ or more thick, of coarse hyphae more or less reticulately woven; basal layer 10–15 μ thick, of compact brownish pseudoparenchyma.

Apothecia up to 0.33 mm. in diameter, small, subspherical to flattened, sometimes with a faint margin of whitish cells, usually single, covering the whole areola, black, carbonaceous; cortex 15 μ thick, of thick-walled dark cells continuous with the cortex of the areola; parathecium of a few cells merging with the cortex; hypothecium about 20 μ thick, an even layer not tapering, of closely united thin-walled cells, hyaline or faintly tinged brown; thecium up to 110 μ thick; paraphyses tapering from a little more than 1 μ to heads 3 μ or more, often much branched with heads in clusters, slightly darkened on the outer surfaces, epithecium about 10 μ thick, rugose, dark, giving a faint greenish reaction with KOH; asci 35–53 × 13–18 μ, elongate-clavate, becoming shorter and stouter at maturity when the spores distend them appreciably, 8-spored (but occasionally 6-, 4-, or 2-spored, with a corresponding increase in size of the ascospores); ascospores 2-celled, 8–10(–13) × 5–6(–7.5) μ, somewhat constricted at the septum, sometimes undivided, slightly pointed or blunt, dark brown.

On quartz crystals, leucogranite, granodiorite, biotite sericite, and dark greenish gray slate.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-18*, type, *HW-9, HW-11* (sterile.)

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-1, R-2, R-7, R-26-27;* Skua Gull Peak, *P. Siple & S. Corey 72W-9, 72W-11, 72-16* (in close association with *Buellia albida);* Chester Mts., *P. Siple & S. Corey 97A-4;* Mt. Donald Woodward, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff DW-5.*

Buellia frigida Darbishire, Brit. Nat. Antarct. [Discovery] Exp. Nat. Hist. **5**: Lichenes, 7. 1910.

Pl. 57, figs. 327–332, 335; pl. 65, fig. 427.

Illustrations: Darbishire, *Ibid. pl. 1, f. 4;* Brit. Antarct. [Terra Nova] Exp. Bot. **3**: *pl. 1, f. 5, 6.*

Type: South Victoria Land, Granite Harbor, McMurdo Bay, *British National Antarctic [Discovery] Expedition.*

Thallus well developed, up to 7 cm. in diameter; non-assimilative portion black, carbonaceous, thick, overhanging at the margins, or the smaller parts thinning out, the whole forming a distinct zone 5–7.5 mm. wide, not differentiated into assimilative and non-assimilative portions, inside the black margin white flakes with a few black edges basally, more diffused centrally until often quite scattered, radiately cracked, the areolae irregular and angular; upper cortex 6–7 μ thick, capitate-fastigiate, but appearing as a single layer of dark thick-walled isodiametric cells, the hyphae bearing them thicker-walled but not otherwise differentiated from those of the algal and medullary layers; algal layer variable in thickness, protococcoid, cells small, 4–7 μ; medulla variable in thickness, of loosely woven thin-walled hyphae somewhat vertically arranged; basal layer brownish, about 15 μ, of compact dark brown, more or less isodiametric cells elongating upwards and merging with the medullary hyphae.

Apothecia carbonaceous, somewhat shiny, sessile or subsessile on the white assimilative areolae, flat to convex and almost spherical, up to 0.75 mm. in diameter, with or without a rim, sometimes with an equatorial white cortical remnant [those sectioned measure 120–205 μ tall and 410–650 μ in diameter]; cortex 15–17 μ thick, a palisade of isodiametric cells; medulla of vertical brown hyphae loosely woven and extending to the basal layer; parathecium not differentiated; hypothecium brown, 30–80 μ in the center, tapering to 2–8 μ at the margin and merging with the cortical cells, pseudoparenchymatous, with a tendency to periclinal arrangement; thecium 90–110 μ tall; paraphyses 50–60 × 2 μ, branched or unbranched, septate, when young scarcely expanded, when mature the walls thickened, expanding to a large apical head 4 μ in diameter, darkened at the surface, tapering slightly below the head; asci short, bluntly clavate, with a well-developed sheath, 8-spored, 36–46 × 14.5–17 μ; ascospores dark, 2-celled, blunt, rarely or only slightly constricted, sometimes undivided, 9–13 × 5–8 μ.

On sericite-orthoclase schist and granodiorite.

MARIE BYRD LAND: Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey 73-11;* Chester Mts., *P. Siple & S. Corey 97A-4.*

BUELLIA **albida** Dodge & Baker, sp. nov. Pl. 60, figs. 365–369.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-11,* growing with *Buellia dendritica.*

Pars non assimilans parva, funiculis tenuibus hypharum nigrarum, reticulata vel irregulariter radians, saxicola; cortex medullaque non evoluta; areolae assimilantes ad 0.67 mm. diametro, irregulares, applanatae vel pustulares, mollissimae madefactae, albidae, sparsae, non continuae; cortex non evolutus, amorphus; algae magnae, sparsae, non abundantes; medulla ad 75 μ crassitudine, laxissime implexa, circum algas bene evoluta; stratum basale ad 20 μ crassitudine, cellulis parvis brunneis compactum.

Apothecia ad 0.35 mm. diametro, subspherica, conica hemisphericave, sessilia, singula, totas areolas tegentia vel annulum cellularum corticalium emortuarum equatorialiter reliquentia, sparsa, singula raro plura in quaque areola, nigra; cortex paucis cellulis brunneis; hypothecium ad 45 μ crassitudine, tenuescens, obscure brunneum reticulatim subtus densius dispositis; thecium 35 μ altitudine; paraphyses 1.5 μ diametro, capitibus obscuris, ad 3 μ diametro, ramosi vel non ramosi, vaginati, epithecium ad 5 μ; asci 37–46(–49) × 13–16 μ, elongati, clavati, vaginati; ascosporae octonae, abnormaliter senae, quaternae vel binae, uniseptatae, subacutae, subconstrictae, brunneae, 11–14 × 5.5–7 μ.

Non-assimilative portion extremely scant, consisting of a few delicate strands of black hyphae, reticulate or irregularly radiating, usually scarcely discernible, covering areas of a few mm. on the rock; no morphological differentiation of cortex and medulla; assimilative areolae up to 0.67 mm. in diameter, irregular in outline, flat to pustular, extremely soft when moistened, whitish, scattered, not continuous; cortex not distinct, almost amorphous; medulla up to 75 μ thick, very loose, best developed around the algae which are large but not abundant, near the outer surfaces; basal layer up to 20 μ thick, of dark small cells compactly arranged.

Apothecia up to 0.35 mm. in diameter, subspherical to conical or hemispherical, sessile upon the areolae, a single one frequently covering the entire areola or leaving only a whitish equatorial zone of dead cortical cells, scattered, usually one per areola, sometimes more, black; parathecium scarcely differentiated, consisting of a few cells merging laterally with the cortex which consists of a few scattered dark cells at the margin; hypothecium up to 45 µ at the center, diminishing laterally to only a few cells at the margin, dark brown, of more or less reticulate cells, denser at the base than just below the thecium; thecium about 35 µ thick; paraphyses 1.5 µ wide, expanding to the darkened heads up to 3 µ in diameter, branched or unbranched, sheath prominent, epithecium about 5 µ, dark; asci 37–46(–49) × 13–16 µ, elongate, clavate, sheath at the apex especially prominent, usually 8-spored, abnormally with 6, 4, or 2 spores, the spores correspondingly larger; ascospores 11–14 × 5.5–7 µ, 2-celled, ends slightly pointed, slightly constricted at the septum, dark.

Growing with *Buellia dendritica* on sericite-orthoclase schist and on sandy loam.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-10, 72W-11*, type; Mt. Stancliff, *P. Siple & S. Corey 72A-1;* Lichen Peak, *P. Siple & S. Corey 73-1.*

RINODINA

RINODINA S. F. Gray, Nat. Arr. Brit. Pl. **1**: 448. 1821. (pr. p. min.); Massalongo, Ricerche Auton. Lich. 14. 1852.

Lecanora subg. *Rinodina* Ach., Syn. Lich. 146. 1814.

Dimelaena Norm., Nyt Mag. Naturvidensk. **7**: 231. 1853 (pr. p. min.).

Berengeria Trevisan, Riv. Period. Lav. Accad. Padova, 265. 1851-2.

Pleorinis Clements, Gen. Fung. 84. 1909.

Merorinis Clements, Gen. Fung. 84. 1909.

Dictyorinis Clements, Gen. Fung. 84. 1909.

The type species was not designated. Of Gray's species all but three, *R. exigua, R. periclea,* and *R. sophodes,* have been transferred elsewhere. Acharius had included *R. periclea* and *R. sophodes* in his subgenus. When Massalongo gave the genus its present definition, he described two new species and included *R. oreina* and *R. sophodes* from Archarius' subgenus. Since *R. oreina* is the type of *Beltraminia,* and since *R. sophodes* is the only species common to all three treatments, the latter may be taken as the type. Thus it will conserve the name in the sense it has been almost universally used since it was redefined by Massalongo. *Dimelaena* Norm. was based on six species now included in *Physcia* and on four species in *Rinodina.* As it is antedated by either genus, a consideration of its type species is relatively unimportant. *Berengeria* was proposed shortly after *Rinodina* was redefined by Massalongo, and contains all the species proposed by Massalongo, including his new ones, with some others. It was early abandoned as a synonym of *Rinodina. Pleorinis* was based on *R. polyspora* Th. Fr. *Merorinis* was based on *R. Conradi* Koerb. and is available if the subsection *Conradia* is raised to generic rank. *Dictyorinis* was based on *R. diplinthia* Nyl. for the species of *R. Eurinodina* subsect. *Conradia* with muriform spores.

Thallus crustose, rarely squamulose, uniform or with an effigurate margin (in *Beltraminia),* attached to the substrate by hyphae of the prothallus or of the medulla, without rhizinae; ecorticate, or with a fastigiate cortex, or in the higher forms with a palisade of pseudoparenchyma; algae protococcoid; medulla of loosely woven thin-walled hyphae. Apothecia circular, immersed or sessile, lecanorine, but in some species with the algae early disappearing from the amphithecium; parathecium thin or absent; epithecium dark or black, horny or pulverulent, usually colored purple or violet with KOH; hypothecium hyaline, rarely dark; paraphyses filiform, seldom forked, more or less gelified, usually capitate; asci normally 8-spored, exceptionally up to 24 spores; spores smoke gray, brown, or black, 2–4-celled, wall very thick, commonly united by an isthmus. Spermogonia immersed or in warts, irregularly flask-shaped; spermatia small, elongate, straight.

Malme (Bih. K. Svensk. Vetensk. Akad. Handl. III. **28**^{1}: 7–15. 1902) divided the genus into four sections and subdivided the section *Eurinodina* into two subsections (for characters see p. 631). Vainio (Ark. f. Bot. **8**^{4}: 76–82. 1909) proposed

Melanaspicilia for species with immersed apothecia which Zahlbruckner has placed in *Eurinodina.* This entity seems worthy of recognition as another section at least. Several of the other sections have also been described as genera. A monograph of the genus is badly needed. Two species from the Antarctic Archipelago belong in *Beltraminia,* three in *Melanaspicilia,* and two besides our two from Marie Byrd Land and King Edward VII Land belong to *Eurinodina,* subsect. *Pachysporaria.*

KEY TO ANTARCTIC SPECIES

- Thallus effigurate; spore walls thin, not polaribilocular .... BELTRAMINIA
  - Spores 18–20 × 8–10 μ; apothecia 0.25 mm.; thallus 3 mm. thick ...... *R. crassa*
  - Spores 14–17 × 6.5–9 μ; apothecia 0.5–1.3 mm.; thallus 0.5–0.6 mm. .... *R. Petermanni*
- Thallus uniform; spores 2-celled.
  - Apothecia immersed; hypothecium fuscous .... MELANASPICILIA
    - Parathecium not developed; thallus KOH– .... *R. hypopoichila*
    - Parathecium hyaline.
      - Cortex 15–20 μ, KOH yellow, rarely reddening in the center .... *R. ditissima*
      - Cortex 20–40 μ, KOH red .... *R. erythrodia*
  - Apothecia sessile .... EURINODINA subsect. PACHYSPORARIA
    - Spores 11–13.5 × 6–8 μ; apothecia 1.35 mm .... *R. sordida*
    - Spores 20–28 × 8–13 μ.
      - Cortex 30–40 μ; apothecia 1.20 μ; paraphyses 1 μ in diameter .... *R. olivaceobrunnea*
      - Cortex 10 μ; apothecia 0.2–0.6 μ; paraphyses 3 μ .... *R. egentissima*
    - Spores 28–34 × 12–14 μ .... *R. turfacea*

RINODINA **sordida** Dodge & Baker, sp. nov.

Pl. 61, figs. 387–392.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-6.*

Thallus ad 3 cm. diametro; pars non assimilans parva, nigra; cortex capitato-fastigiatus, cellulis brunneis pachydermaticis; medulla non bene evoluta, cellulis hyalinis vel pallide brunneis; stratum basale cortici simile; areolae assimilantes ad 1 mm. diametro, angulares, diffractae, continuae, albae vel sordide griseae, marginibus nigris; cortex fastigiatus, lateribus bene evolutus, saepe cum strato conspicuo cellularum emortuarum tectus; stratum gonidiale non bene evolutum, algis in dimidio superiore sparsis; algae ad 18 μ diametro, protococcoideae; medulla hyphis laxe contexta; stratum basale cellularum parvarum obscurarum.

Apothecia ad 1.35 mm. diametro, angularia, sinuosa vel hemispherica, convexa, applanata, marginata vel concava, superficie nonnumquam diffracta, sparsa vel conferta, in areolis sessilia; amphithecium 100 μ crassitudine; cortex 20 μ, cellulis sphericis subhyalinis; stratum gonidiale cellulis 4–5 μ diametro, sparsis; medulla deest; hypothecium ad 230 μ crassitudine, ad marginem tenuescens, hyalinum, cellulis minutis compactum; parathecium deest; thecium ad 70 μ altum; paraphyses 1 μ, apicibus 2–5 μ diametro, ramosi sub apicibus vel non ramosi, septati, pachydermatici; asci 47–54–63 × 16–19 μ, clavati, vaginati, maturitate breviores; sporae octonae, 11–13.5 × 6–8 μ, uniseptatae, subconstrictae, obtusae acutaeve, brunneae.

Thallus up to 3 cm. in diameter; non-assimilative portion scant, black, dull; cortex capitate-fastigiate, cells brown and thick-walled; medulla not differentiated morphologically, cells hyaline to pale brown; basal layer similar to the cortex; assimilative areolae up to 1 mm. in diameter, angular by deep cracks, continuous, white to dark gray, the margins frequently blackened; cortex fastigiate, well developed laterally and in places over the upper surface, often with a conspicuous zone of dead cortical cells; algal layer not well differentiated, cells scattered in the upper half of the thallus; algae up to 18 μ in diameter, protococcoid; medulla of loosely woven hyphae; basal layer of dark, small, closely united cells merging laterally with the fastigiate cortex.

Apothecia up to 1.35 mm. in diameter, angular, sinuous or hemispherical, convex, flattened with a faint margin or umbilicate, surface cracked, scattered or closely gregarious, sessile on the areolae; amphithecium 100 μ thick; cortex 20 μ thick, of spherical subhyaline cells; gonidial layer of scattered cells 4–5 μ in diameter; no medulla or parathecium; hypothecium up to 230 μ thick, thinning toward the margin, hyaline, compact, of small cells; thecium up to 70 μ thick; paraphyses 1 μ expanding to apices 2–5 μ, branched or unbranched, conspicuously septate, thick-walled, the outer surfaces of the heads with a prominent dark cap, often much branched near the top forming short clusters of branches each a few cells long; asci 8-spored, 47–54–63 × 16–19 μ, slender, clavate with a well developed gelified sheath, the mature asci shorter and stouter as the spores fill the sac; ascospores 11–13.5 × 6–8 μ, 2-celled, slightly constricted at the septum, blunt or pointed, dark brown.

On orthoclase-sericite-siderite schist.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-6*, type, *72W-13*.

RINODINA **olivaceobrunnea** Dodge & Baker, sp. nov.
Pl. 61, figs. 381–386.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-13.*

Thallus olivaceo-brunneus, gelifactus, mollis; cortex 30–40 μ, pseudoparenchymaticus, paullo obscurus, cum strato cellularum corticalium emortuarum tectus; medulla hyphis reticulatim implexis; stratum basale cortici simile, nonnumquam obscurius, raro attenuatum, in funiculis subrhizoideis.

Apothecia ad 1.20 mm. diametro, irregularia, angularia vel circularia, applanata, marginibus crenulatis, disco nigro, excipulo pallide olivaceo, subsessilia; cortex continuus cum ei thalli; stratum gonidiale 55–60 μ crassitudine, ad 40 μ sub hypothecio tenuescens, cellulis 10–12 μ, sine vaginis; parathecium 20–25 μ crassitudine, hyalinum, continuum cum hypothecio, non cum cortice mergens; hypothecium 20–30 μ crassitudine, hyalinum, pseudoparenchymaticum; thecium 100–120 μ altitudine; paraphyses 1 μ diametro, capitibus pallide brunneis, 2–3 μ, ramosi, vagina non prominente, epithecium circa 10 μ crassitudine, pallide brunneum, gelifactum; asci 70–92 × 16–28 μ, elongato-clavati, apicibus vaginatis; ascosporae octonae, 22–28 × 10–13 μ, uniseptatae, raro polaribiloculares septoque constrictae, obscure brunneae.

Assimilative portion of thallus spreading among loose gravel and mosses, not conspicuous, olive brown to black, rather gelified, soft; cortex 30–40 μ, fastigiate, pseudoparenchymatous, outer cells slightly darkened, frequently with a thick layer of dead cortical cells covering the outside; medulla of loosely and reticulately woven hyphae; basal layer similar to the cortex, occasionally darker or attenuated into almost rhizoidal strands of attachment.

Apothecia up to 1.20 mm. in diameter, irregular in shape, angular to circular, flattened, with a distinct, often somewhat crenulate margin, disc black with a white to pale olive exciple, subsessile; cortex continuous with that of the thallus and of the same structure; algal layer protococcoid, 55–60 μ, thinning to 40 μ under the hypothecium, cells 10–12 μ, without the thick sheaths; parathecium 20–25 μ thick, continuous from the hypothecium, not merging with the cortex; hypothecium 20–30 μ thick, dark, pseudoparenchymatous; thecium 100–120 μ tall; paraphyses 1 μ in diameter expanding to pale brown heads 2–3 μ in diameter, mostly branched, the outer surfaces of the heads with a narrow darkened rim, sheath not prominent, epithecium about 10 μ thick, pale brown, gelified; asci 70–92 ×

16–28 μ, 8-spored, broadening at maturity but elongate-clavate when young with a very prominent gelified sheath at the tips; ascospores 22–28 × 10–13 μ, 2-celled, sometimes connected by a canal, rarely constricted at the septum, dark brown.

Growing over mosses and gravel from coarse-grained pink granite.

In the younger areolae, the upper cortex consists of 3–6 layers of isodiametric cells.

KING EDWARD VII LAND: Rockefeller Mts., Mt. Helen Washington, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW-2, HW-6, HW-9, HW-12, HW-13, HW-18.*

MARIE BYRD LAND: Edsel Ford Range, Mt. Rea-Cooper, *P. Siple, F. A. Wade, S. Corey & O. D. Stancliff R-2, R-4;* Skua Gull Peak, *P. Siple & S. Corey 72W-13,* type.

PHYSCIACEAE

Thallus foliose, repeatedly lobed, more rarely subfruticose, usually attached to the substrate by rhizinae, heteromerous, dorsiventral or radiate; corticate; with *Protococcus* algae. Apothecia circular, sessile, lecideine or lecanorine; paraphyses simple; asci 8-spored; ascospores brown, 2-celled, rarely 4-celled, or by the formation of a few vertical septa, few-celled muriform with a thickened spore wall. Spermatia short, straight.

Only sterile specimens referred to *Physcia* have been found in the Antarctic.

PHYSCIA

PHYSCIA (Schreber) Hampe ap. Furnrohr, Naturh. Topogr. Regensburg **2**: 249. 1839.

Lichen subgen. *Physcia* Schreber in Linné, Gen. Pl. ed. 8. 768. 1791.

The nomenclatorial history of *Physcia* and the correct application of the name is difficult to trace as we have not had access to all the pertinent literature. In the first half of the nineteenth century the name was applied to various groups of Parmeliaceae, Teloschistaceae, and Physciaceae. From the synonymy listed in Zahlbruckner, Cat. Lich. Univ. **7**: 577–704. 1931, apparently the first combination of a species in the genus as now recognized was *P. hispida* (Hoffm.) Frege, Deutsch. Bot. Taschenbuch **2**: 169. 1812. Hampe (ap. Furnrohr, Naturh.

Topogr. Regensburg **2**: 249–250. 1839) added four species at present recognized in this genus. By 1860 Nylander and Th. M. Fries described the genus in its present sense except for more recent segregates. From such data as are available, the type species appears to be *P. pulverulenta* (Schreber) Hampe, the only species of this genus described by Schreber, or *P. hispida* (Hoffm.) Frege. Either of these species would conserve the name in the sense current among modern lichenologists.

Thallus foliose, appressed or ascending, usually attached to the substrate by rhizinae, repeatedly lobed, laciniae mostly slender; upper cortex a palisade of hyphae forming a pseudoparenchyma; lower cortex of periclinal hyphae not greatly differentiated from the medulla (fastigiate in *P. fuscella* from Antarctica); algae *Protococcus;* medulla arachnoid, of thin-walled periclinal hyphae; apothecia circular, sessile, lecanorine, disc brown to black, nude or pruinose; paraphyses simple, usually septate; epithecium not colored by KOH; hypothecium hyaline or dark; asci 8-spored; ascospores brown, elongate to ellipsoidal, usually 2-celled, rarely 4-celled or few-celled muriform, wall thickened; spermogonia immersed or slightly protruding; spermatia elongate to long-cylindric, straight, or in a few species filiform and curved.

The sections are separated as follows:

Hypothecium black; spores 2-celled; tropical and subtropical...........DIRINARIA
Hypothecium hyaline.
  Spores 2-celled ....EUPHYSCIA
  Spores few-celled muriform; New Zealand.....................HYPERPHYSCIA

For key to Antarctic species see p. 584.

LICHEN PARASITES

Besides the possible parasites described on p. 525 as *Thelidium Caloplacae* and *T. parvum,* the following species has been found on *Parmelia.*

DIPLONAEVIA **Parmeliae** Dodge & Baker, sp. nov.
Pl. 62, figs. 396–400.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-3.*

Apothecia ad 150 μ diametro, fusca nigrave, convexa, emarginata; parathecium 10–15 μ crassitudine, pseudoparenchymaticum, obscurum; hypothecium 20 μ crassitudine, brunneum, hyphis dense irregulariter intertextis; medulla dilutior, cellulis brevibus irregularibus, 2 × 4 μ; thecium 30–35 μ altitudine; paraphyses 1 × 1.5 μ, recti, septati, apicibus expansis obscuris ramosis, epithecium 10–15 μ, obscurum, rugosum; asci 21–24 × 8–10 μ, breviter clavati, vagina tenui; ascosporae 7–8 × 2–2.5 μ, octonae, hyalinae, vaginatae.

Apothecia up to 150 μ in diameter, fuscous to black, convex, emarginate; parathecium 10–15 μ thick, pseudoparenchymatous, dark; hypothecium about 20 μ thick, brownish, of irregularly and densely interwoven hyphae; medulla of the same texture, lighter, of short irregular cells 2 × 4 μ, ending irregularly in the host tissue; thecium 30–35 μ tall; paraphyses 1–1.5 μ, straight, septate, the tips slightly enlarged, darkened, possibly branched; epithecium 10–15 μ thick, dark, rugose, continuous with the parathecium; asci 21–24 × 8–10 μ, short-clavate with a thin sheath, 8-spored, ascospores 7–8 × 2–2.5 μ, apparently 2-celled, one end slightly pointed, the other more blunt, hyaline with a faint halo.

Parasitic on *Parmelia variolosa* Dodge & Baker.

MARIE BYRD LAND: Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey 72W-3.*

Explanation of Plate

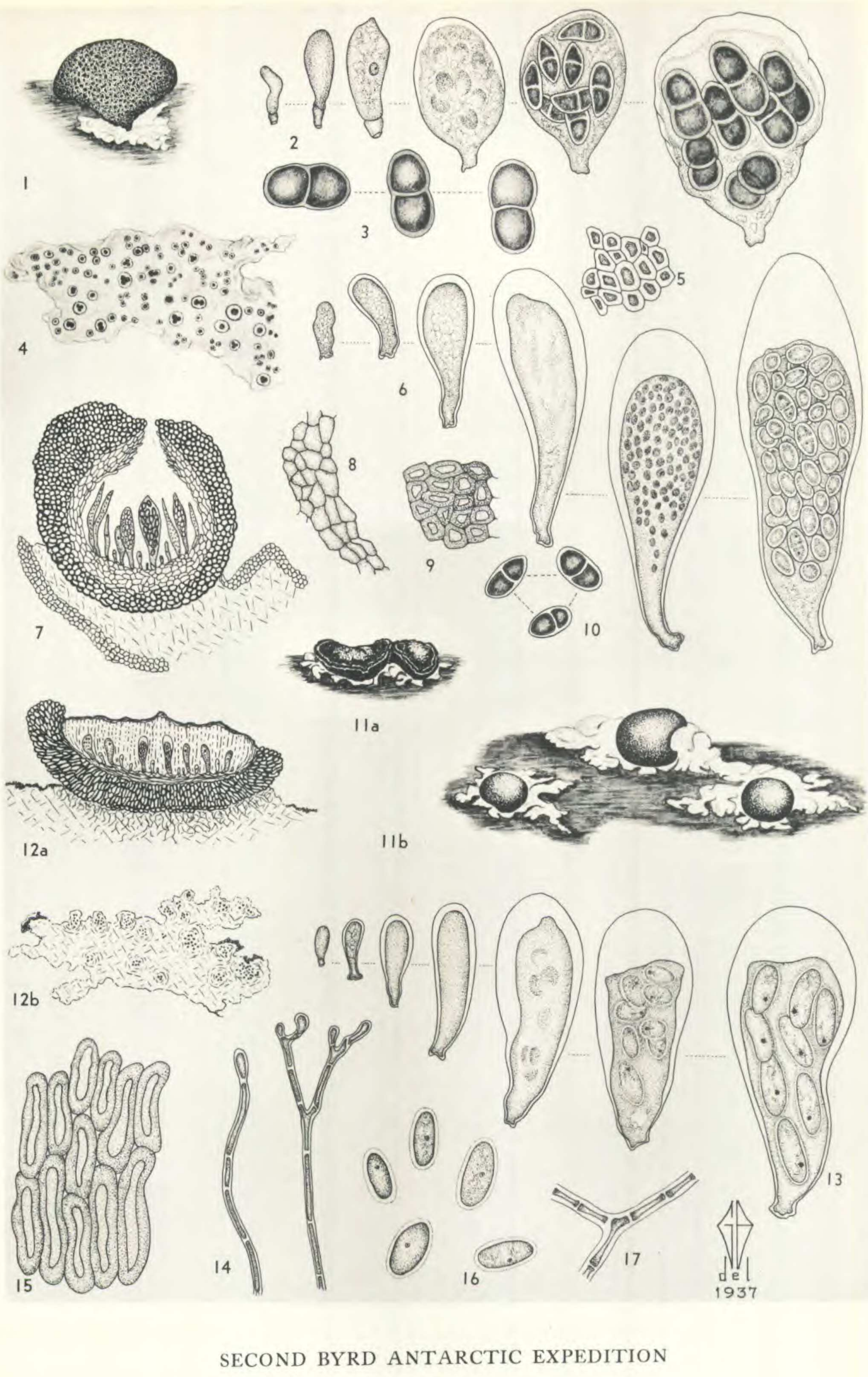
PLATE 38

All figures except the habit sketches were drawn with the aid of an Abbé camera lucida. Magnifications are given for each figure.

Figs. 1–5. *Thelidium inaequale.*
- Fig. 1. Habit sketch of perithecium and thallus. × 104.
- Fig. 2. Development of ascus through maturity. × 1100.
- Fig. 3. Mature spores. × 1100.
- Fig. 4. Detail of gelatinous, non-cellular thallus. × 434.
- Fig. 5. External view of the apothecial wall cells. × 434.

Figs. 6–10. *Thelidium Caloplacae.*
- Fig. 6. Development of ascus through maturity. × 1100.
- Fig. 7. Section of perithecium and host. × 218.
- Fig. 8. Detail of cells from inner wall of perithecium. × 1100.
- Fig. 9. Detail of cells from outer wall layers of the perithecium. × 1100.
- Fig. 10. Mature spores. × 1100.

Figs. 11–17. *Lecidea capsulata.*
- Fig. 11a. Habit sketch, apothecia with marginal rims; from Mt. Rea. × 65.
- Fig. 11b. Habit sketch, apothecia without marginal rims; from Mt. Donald Woodward. × 65.
- Fig. 12a. Section through apothecium. × 1100.
- Fig. 12b. Section through thallus. × 1100.
- Fig. 13. Development of ascus through maturity. × 1100.
- Fig. 14. Paraphyses. × 1100.
- Fig. 15. Detail of cells from the hypothecium. × 1100.
- Fig. 16. Mature spores from various collections showing variation in size and shape. × 1100.
- Fig. 17. Hyphae from the thallus medulla. × 1100.


1
2
3
4
5
6
7
8
9
10
11a
11b
12a
12b
13
14
15
16
17
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 39

Figs. 18–21. *Lecidea Wadei.*

Fig. 18. Section through apothecium and thallus, showing amorphous basal region with clumps of bacteria. × 104.

Fig. 19. Development of ascus through maturity. × 1100.

Fig. 20. Paraphysis. × 1100.

Fig. 21. Mature spores. × 1100.

Figs. 22–28. *Lecidea Siplei.*

Fig. 22. Habit sketch of thallus and apothecia. × 20.

Fig. 23. Paraphyses. × 1100.

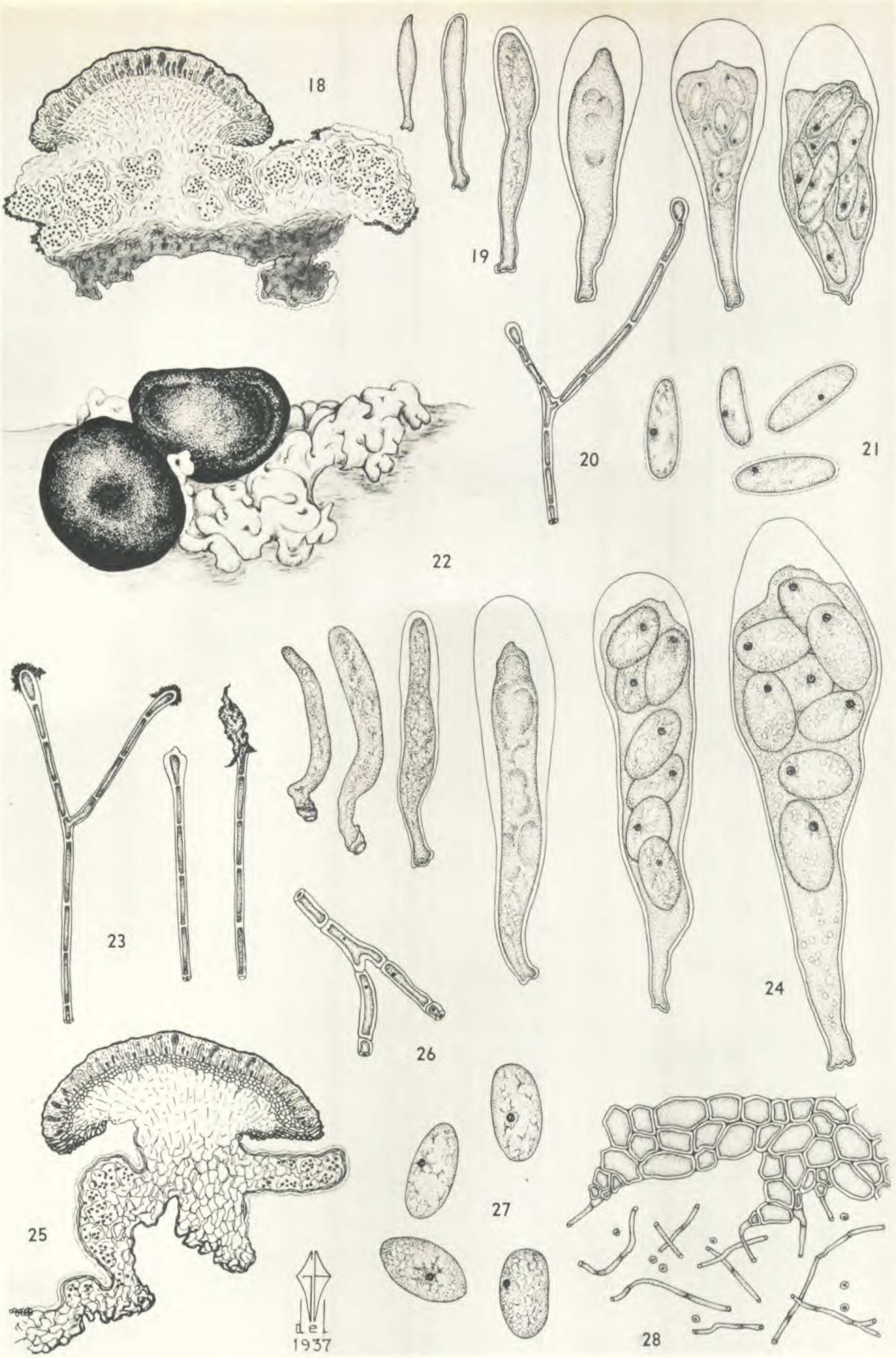
Fig. 24. Development of ascus through maturity. × 1100.

Fig. 25. Section through apothecium and thallus. × 35.

Fig. 26. Hyphae from the reticulate medulla of the thallus. × 1100.

Fig. 27. Mature spores. × 1100.

Fig. 28. Detail of cells from the hypothecium and adjoining filamentous medulla. × 1100.


18
19
20
21
22
23
24
25
26
27
28
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 40

Figs. 29–34. *Lecidea Coreyi.*

Fig. 29. Section through apothecium and thallus. × 55.

Fig. 30. Detail of hypothecial cells and adjacent medulla with thinner-walled cells. × 1100.

Fig. 31. Paraphyses. × 1100.

Fig. 32. Development of ascus through maturity. × 1100.

Fig. 33. Mature spores. × 1100.

Fig. 34. Detail of medullar hyphae. × 1100.

Figs. 35–38. *Lecidea ecorticata.*

Fig. 35. Section through apothecium and thallus. × 55.

Fig. 36. Paraphyses. × 1100.

Fig. 37. Development of ascus through maturity. × 1100.

Fig. 38. Spores, showing variation in size and shape. × 1100.

Figs. 39–41. *Lecidea Byrdii.*

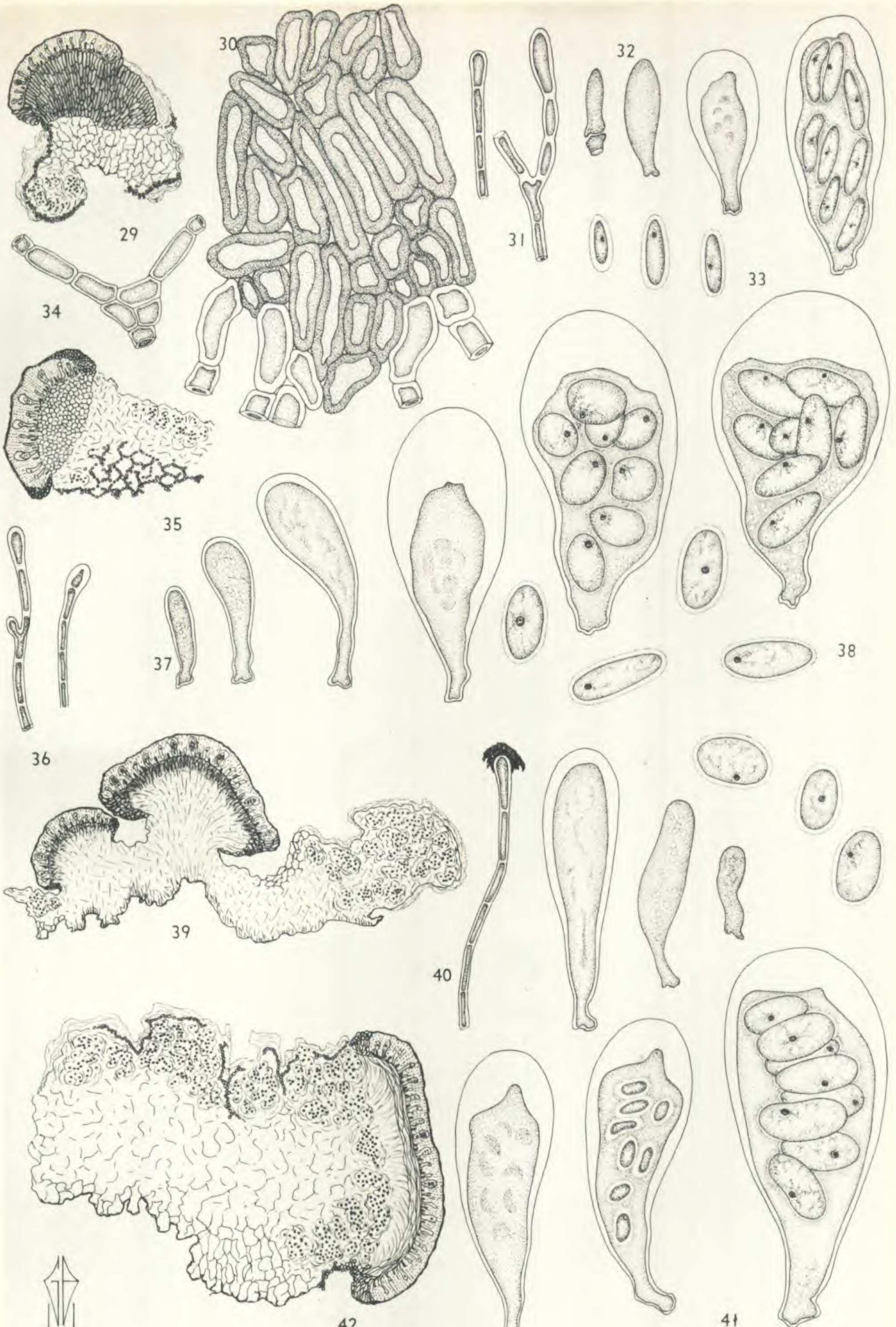
Fig. 39. Section through apothecium and thallus. × 55.

Fig. 40. Paraphysis, the head unusually expanded. × 1100.

Fig. 41. Development of ascus through maturity. × 1100.

Fig. 41a. Mature spores. × 1100.

Fig. 42. *Lecidea Stancliffi.* Section through apothecium and thallus. × 55.

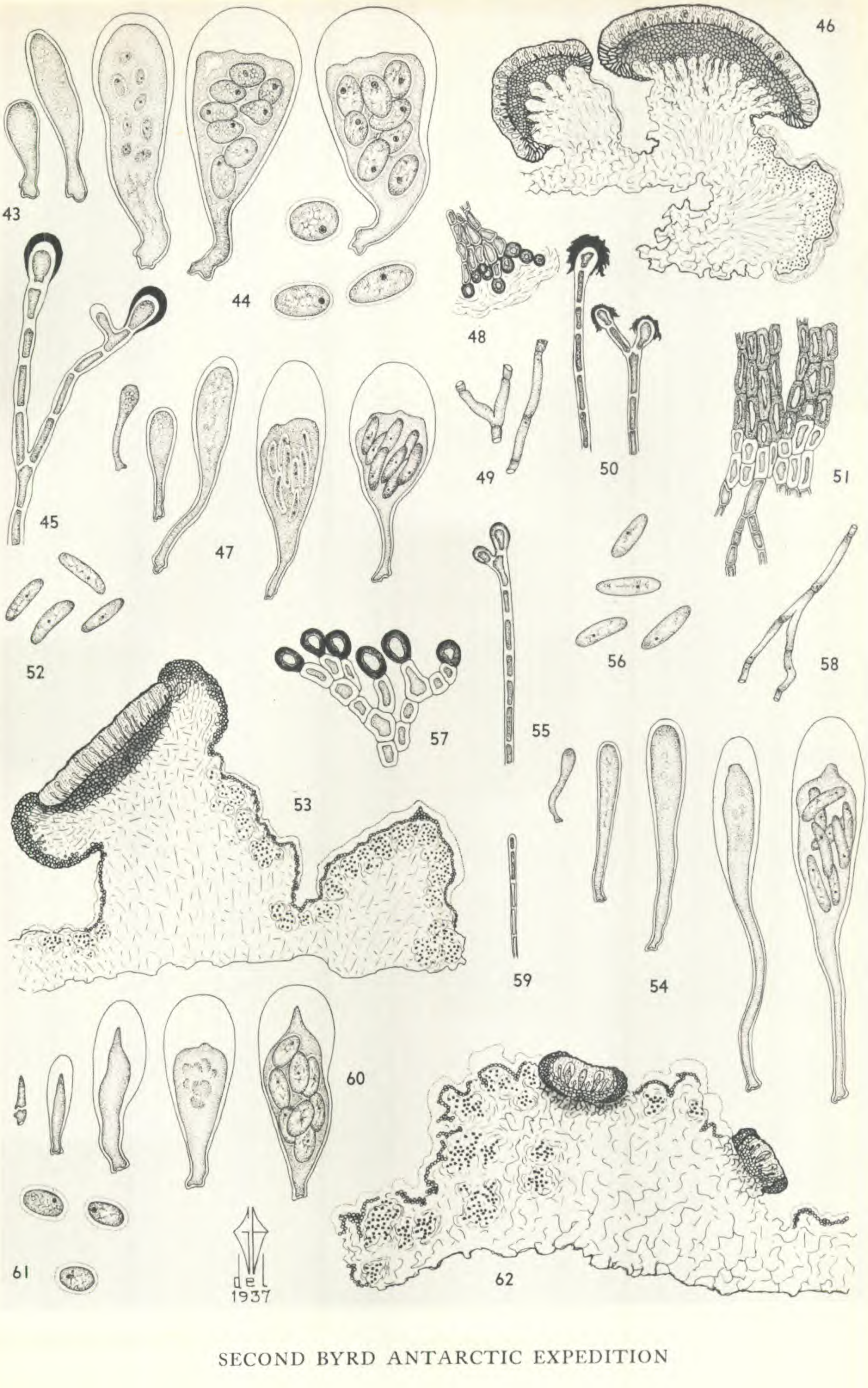

29
30
31
32
33
34
35
36
37
38
39
40
41
42
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 41

Figs. 43–45.	*Lecidea Stancliffi.*
Fig. 43.	Development of ascus through maturity. × 1100.
Fig. 44.	Mature spores. × 1100.
Fig. 45.	Paraphysis. × 1100.
Figs. 46–52.	*Lecidea cancriformis.*
Fig. 46.	Section through apothecia and thallus. × 35.
Fig. 47.	Development of ascus through maturity. × 1100.
Fig. 48.	Detail of cortex of the thallus. × 1100.
Fig. 49.	Medullar hyphae from the thallus. × 1100.
Fig. 50.	Paraphyses. × 1100.
Fig. 51.	Detail of hypothecium. × 1100.
Fig. 52.	Mature spores. × 1100.
Figs. 53–56.	*Lecidea Blackburni.*
Fig. 53.	Section of apothecium and thallus. × 55.
Fig. 54.	Development of ascus through maturity. × 1100.
Fig. 55.	Paraphysis. × 1100.
Fig. 56.	Mature spores. × 1100.
Figs. 57–62.	*Lecidea Painei.*
Fig. 57.	Detail of cortex and subcortical thalline tissues. × 1100.
Fig. 58.	Detail of medullar hyphae. × 1100.
Fig. 59.	Paraphysis. × 1100.
Fig. 60.	Development of ascus through maturity. × 1100.
Fig. 61.	Mature spores. × 1100.
Fig. 62.	Section through thallus and apothecia. × 55.

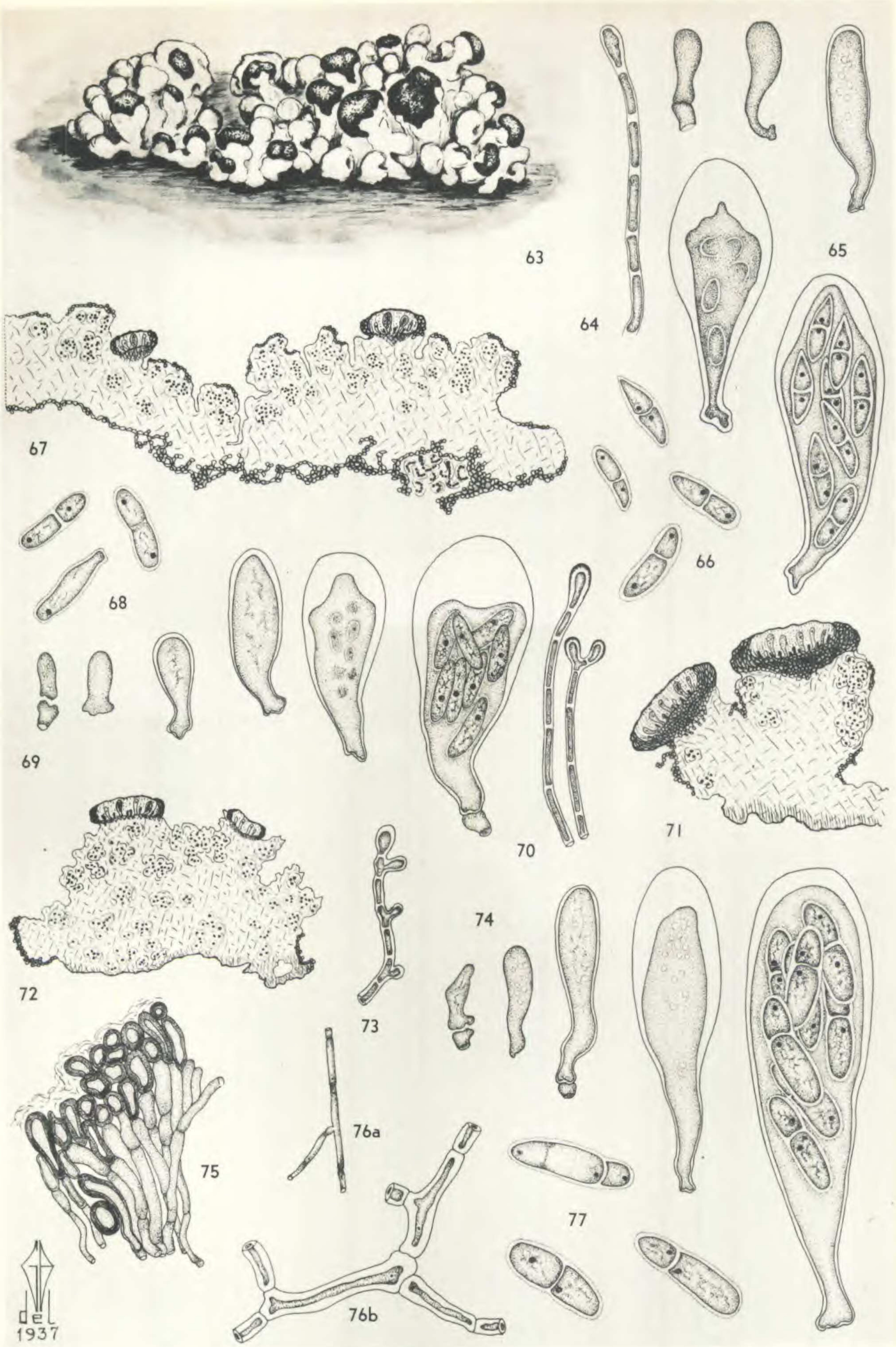

43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 42

- Figs. 63–67. *Catillaria floccosa.*
  - Fig. 63. Habit sketch showing thallus and apothecia. × 24.
  - Fig. 64. Paraphysis. × 1100.
  - Fig. 65. Development of ascus through maturity. × 1100.
  - Fig. 66. Mature spores. × 1100.
  - Fig. 67. Section through apothecia and thallus. × 55.
- Figs. 68–71. *Catillaria cremea.*
  - Fig. 68. Mature spores. × 1100.
  - Fig. 69. Development of ascus through maturity. × 1100.
  - Fig. 70. Section of apothecia and thallus. × 55.
  - Fig. 71. Paraphyses. × 1100.
- Figs. 72–77. *Catillaria arachnoidea.*
  - Fig. 72. Section of apothecia and thallus. × 55.
  - Fig. 73. Paraphysis. × 1100.
  - Fig. 74. Development of ascus through maturity. × 1100.
  - Fig. 75. Detail of parathecium. × 1100.
  - Fig. 76a. Detail of hyphae from sub-apothecial region. × 1100.
  - Fig. 76b. Detail of hyphae from the medulla proper. × 1100.
  - Fig. 77. Mature spores. × 1100.


63
64
65
66
67
68
69
70
71
72
73
74
75
76a
76b
77
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 43

Figs. 78–83. *Catillaria granulosa.*

Fig. 78. Section through apothecium and thallus. × 104.

Fig. 79. Development of ascus through maturity. × 1100.

Fig. 80. Spores in varying degrees of maturity. × 1100.

Fig. 81. Detail of cells from the region adjacent to the thecium. × 1100.

Fig. 82. Paraphysis. × 1100.

Fig. 83. Medullar hypha. × 1100.

Figs. 84–87. *Catillaria inconspicua.*

Fig. 84. Development of ascus through maturity. × 1100.

Fig. 85. Paraphyses. × 1100.

Fig. 86. Section through apothecium and thallus. × 55.

Fig. 87. Spores in varying degrees of maturity. × 1100.

Figs. 88–93. *Rhizocarpon flavum.*

Fig. 88. Spores from different sources and showing variation in size and shape. × 1100.

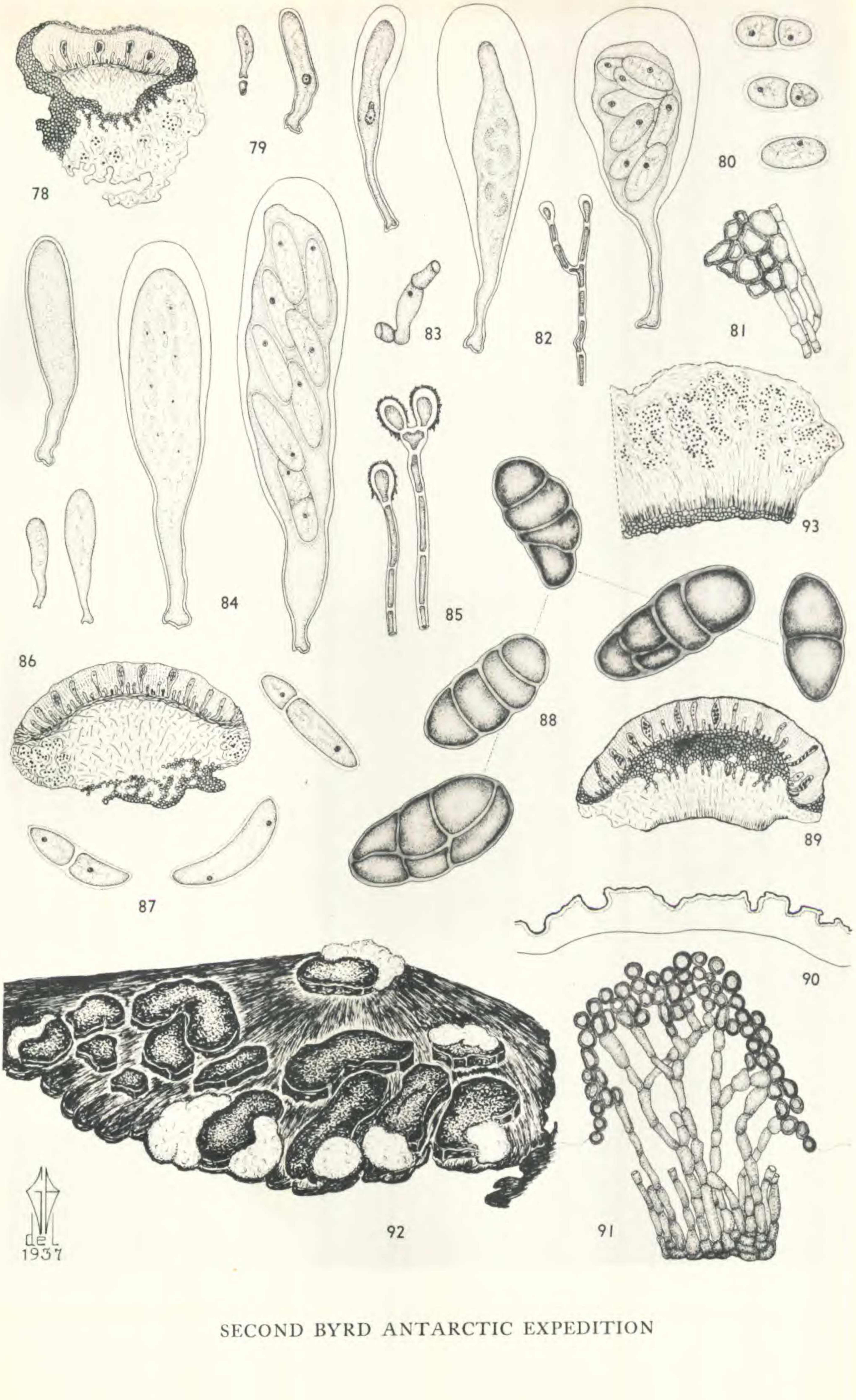
Fig. 89. Section through an apothecium. × 35.

Fig. 90. Section through non-assimilative areola. × 104.

Fig. 91. Detail of non-assimilative areola from base to upper surface. × 434.

Fig. 92. Habit sketch showing non-assimilative areas, assimilative areolae, and apothecia. × 17.

Fig. 93. Section through an assimilative areola. × 35.


78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

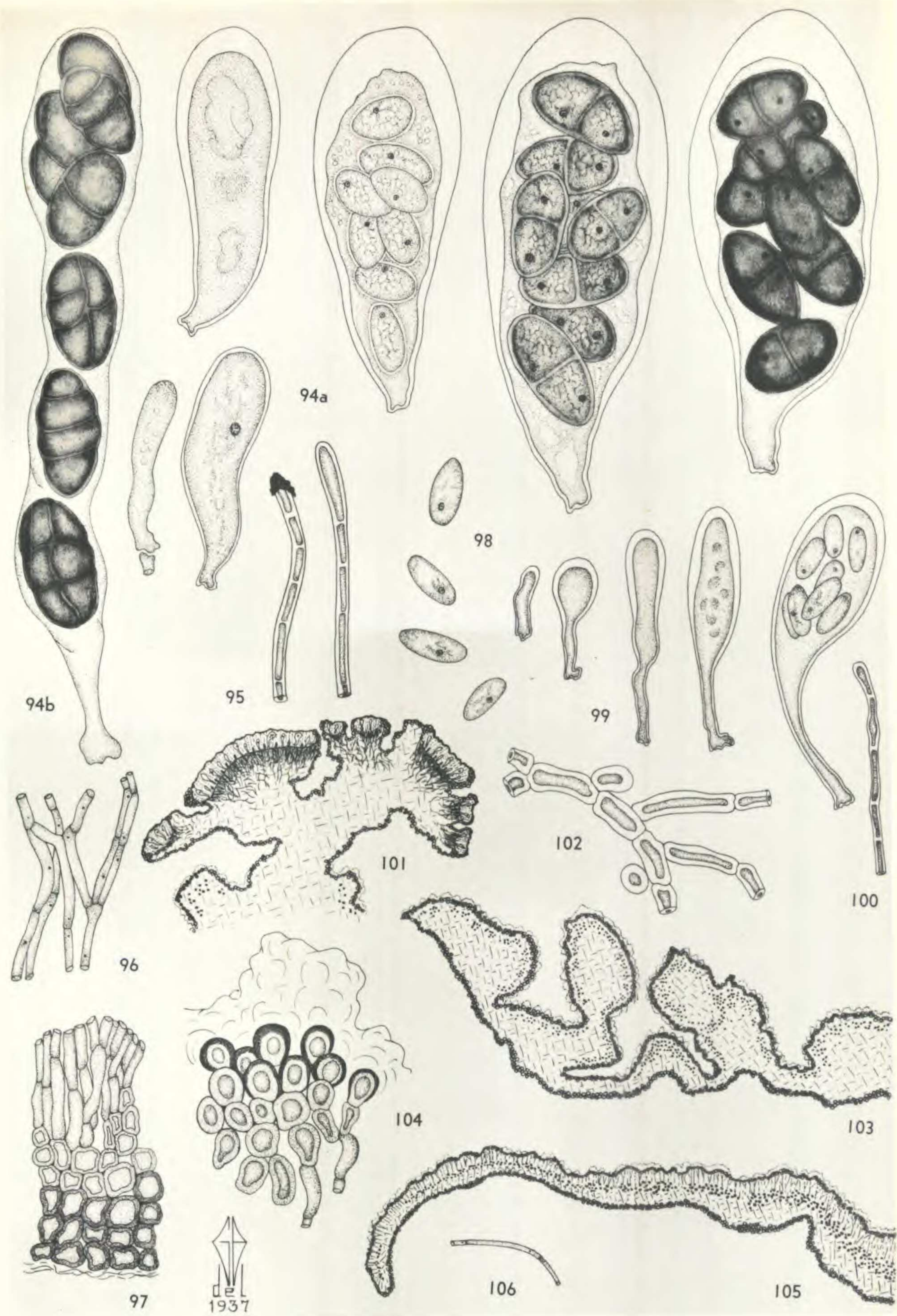
EXPLANATION OF PLATE

PLATE 44

Figs. 94–97. *Rhizocarpon flavum.*
  - Fig. 94a. Development of ascus through maturity. × 1100.
  - Fig. 94b. Extremely attenuated ascus. × 1100.
  - Fig. 95. Paraphyses. × 1100.
  - Fig. 96. Detail of medullar hyphae from assimilative areola. × 1100.
  - Fig. 97. Detail of basal cortex from assimilative areola. × 1100.

Figs. 98–104. *Umbilicaria rugosa.*
  - Fig. 98. Mature spores. × 1100.
  - Fig. 99. Development of ascus through maturity. × 1100.
  - Fig. 100. Paraphysis. × 1100.
  - Fig. 101. Section through apothecium. × 35.
  - Fig. 102. Detail of medullar hyphae. × 1100.
  - Fig. 103. Section through thallus. × 35.
  - Fig. 104. Detail of upper cortex showing extensive decortication. × 1100.

Figs. 105–106. *Umbilicaria pateriformis.*
  - Fig. 105. Section through thallus. × 55.
  - Fig. 106. Detail of medullar hypha. × 1100.


94a
94b
95
96
97
98
99
100
101
102
103
104
105
106
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

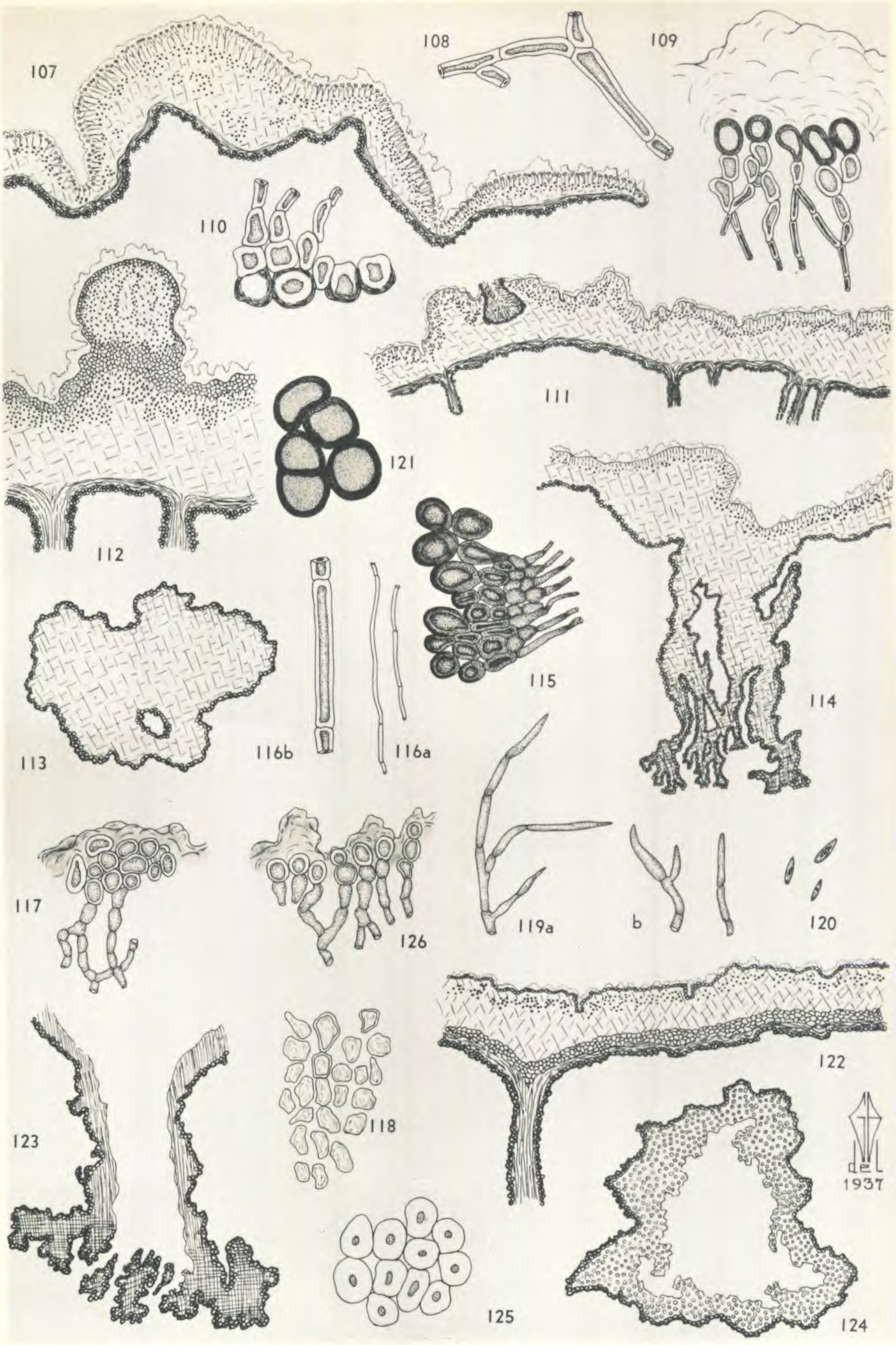
Explanation of Plate

PLATE 45

Figs. 107–110. *Umbilicaria cerebriformis.*
- Fig. 107. Section through thallus. × 35.
- Fig. 108. Detail of medullar hyphae. × 1100.
- Fig. 109. Detail of upper cortex with decorticating zone. × 1100.
- Fig. 110. Detail of basal cortex. × 1100.

Figs. 111–121. *Umbilicaria spongiosa.*
- Fig. 111. Section of thallus with spermagonium. × 18.
- Fig. 112. Section through an isidium. × 55.
- Fig. 113. Cross-section of central thallus attachment. × 18.
- Fig. 114. Longitudinal-section of thallus attachment. × 18.
- Fig. 115. Detail of cortex from rhizoid margin. × 1100.
- Fig. 116a. Fibrous hyphae from rhizoid. × 1100.
- Fig. 116b. Medullar hyphae. × 1100.
- Fig. 117. Detail of upper cortex. × 1100.
- Fig. 118. Detail of upper cortex with extreme decortication. × 1100.
- Figs. 119a and b. Spermatiophores. × 1100.
- Fig. 120. Spermatia. × 1865.
- Fig. 121. Detail of cells from outer covering of spermagonium. × 1100.

Figs. 122–126. *Umbilicaria cristata.*
- Fig. 122. Section of thallus. × 55.
- Fig. 123. Longitudinal-section of central thallus attachment. × 18.
- Fig. 124. Cross-section of central thallus attachment. × 18.
- Fig. 125. Cells from base of central attachment as seen in longitudinal view. × 1100.
- Fig. 126. Detail of upper cortex. × 434.


107
108
109
110
111
112
121
113
116b
116a
115
114
117
126
119a
b
120
123
118
122
del
1937
125
124

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

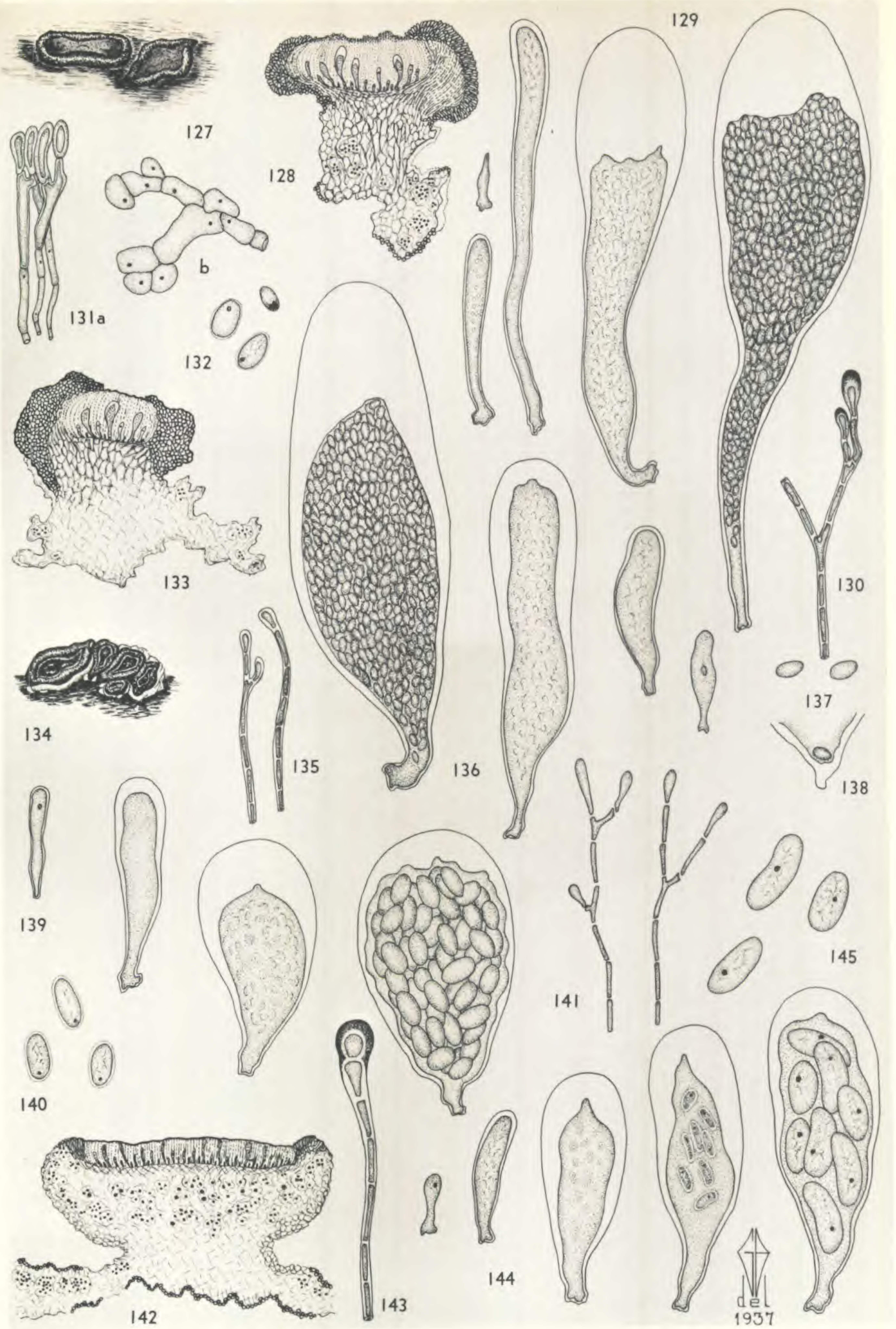
PLATE 46

Figs. 127–132. *Sarcogyne angulosa.*
- Fig. 127. Habit sketch of apothecia. × 27.
- Fig. 128. Section through thallus and apothecium. × 114.
- Fig. 129. Development of ascus through maturity. × 1100.
- Fig. 130. Paraphysis. × 1100.
- Fig. 131a. Cells from the apex of the parathecium. × 1100.
- Fig. 131b. Detail of hyphae from the thallus medulla. × 1100.
- Fig. 132. Mature spores. × 1100. One spore from developing ascus showing nuclear condition. × 1865.

Figs. 133–138. *Sarcogyne grisea.*
- Fig. 133. Section through apothecium and thallus. × 55.
- Fig. 134. Habit sketch. × 14.
- Fig. 135. Paraphyses. × 1100.
- Fig. 136. Ascus development through maturity. × 1100.
- Fig. 137. Mature spores. × 1865.
- Fig. 138. Detail of ascus showing spore at very base. × 1100.

Figs. 139–141. *Biatorella arachnoidea.*
- Fig. 139. Development of ascus through maturity. × 1100.
- Fig. 140. Mature spores. × 1100.
- Fig. 141. Paraphyses. × 1100.

Figs. 142–145. *Lecanora carbonacea.*
- Fig. 142. Section through an apothecium and part of thallus. × 104.
- Fig. 143. Paraphysis. × 1100.
- Fig. 144. Development of ascus through maturity. × 1100.
- Fig. 145. Mature spores. × 1100.

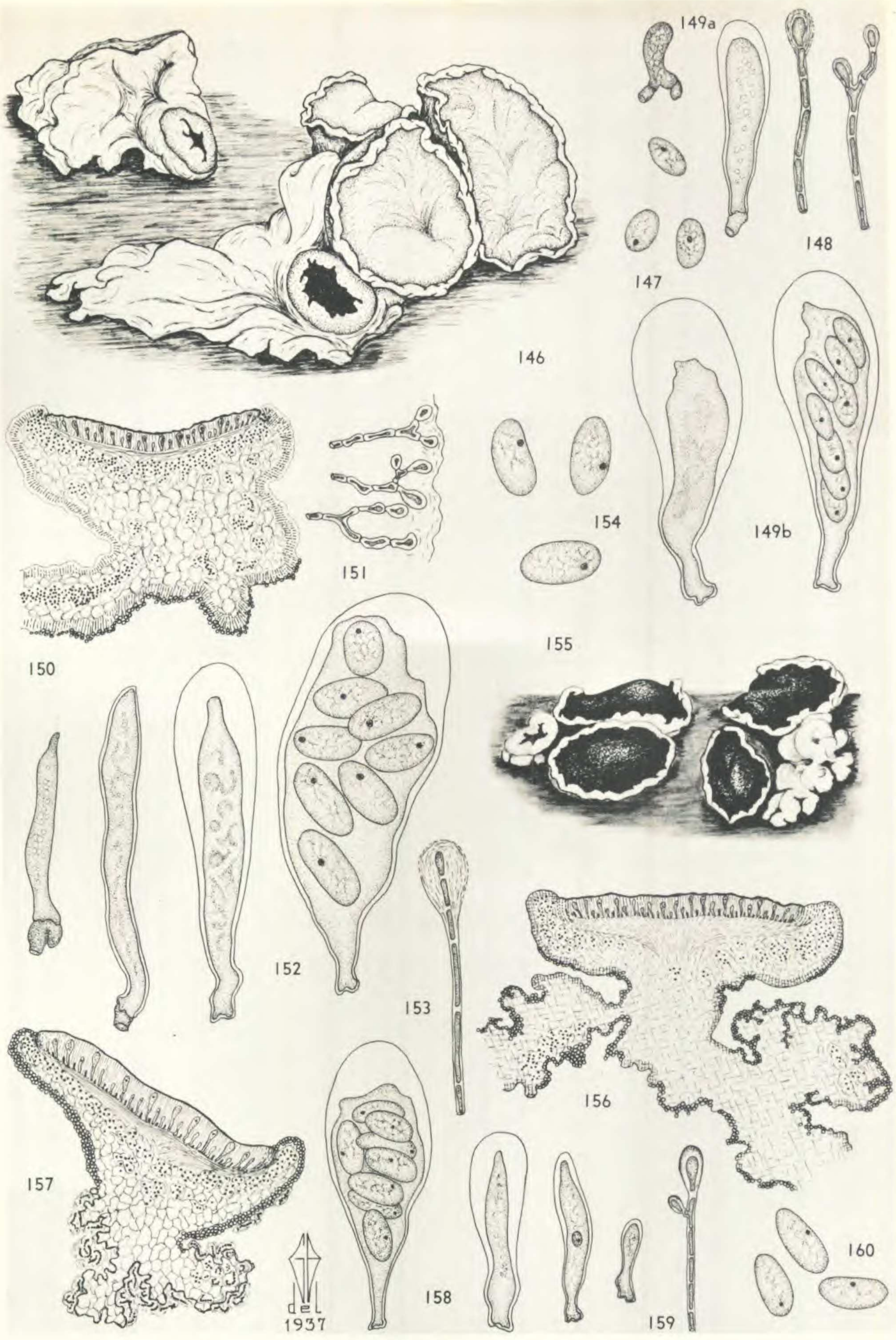

127
128
129
131a
b
132
133
136
130
137
134
135
138
139
145
141
140
142
143
144
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 47

Figs. 146–151. *Lecanora Siplei.*
  Fig. 146. Habit sketch of apothecia and thallus. × 20.
  Fig. 147. Mature spores. × 1100.
  Fig. 148. Paraphyses. × 1100.
  Fig. 149a. Young asci. × 1100.
  Fig. 149b. Older asci. × 1100.
  Fig. 150. Section through apothecium and a portion of thallus. × 35.
  Fig. 151. Detail of fastigiate thalline margin. × 1100.
Figs. 152–156. *Lecanora griseomarginata.*
  Fig. 152. Development of ascus through maturity. × 1100.
  Fig. 153. Paraphysis with a gelatinous head. × 1100.
  Fig. 154. Mature spores. × 1100.
  Fig. 155. Habit sketch of apothecia and thallus. × 20.
  Fig. 156. Section through apothecium and thallus. × 55.
Figs. 157–160. *Lecanora lilacina.*
  Fig. 157. Section through apothecium and thallus showing associated foreign algae. × 55.
  Fig. 158. Development of ascus through maturity. × 1100.
  Fig. 159. Paraphysis. × 1100.
  Fig. 160. Mature spores. × 1100.

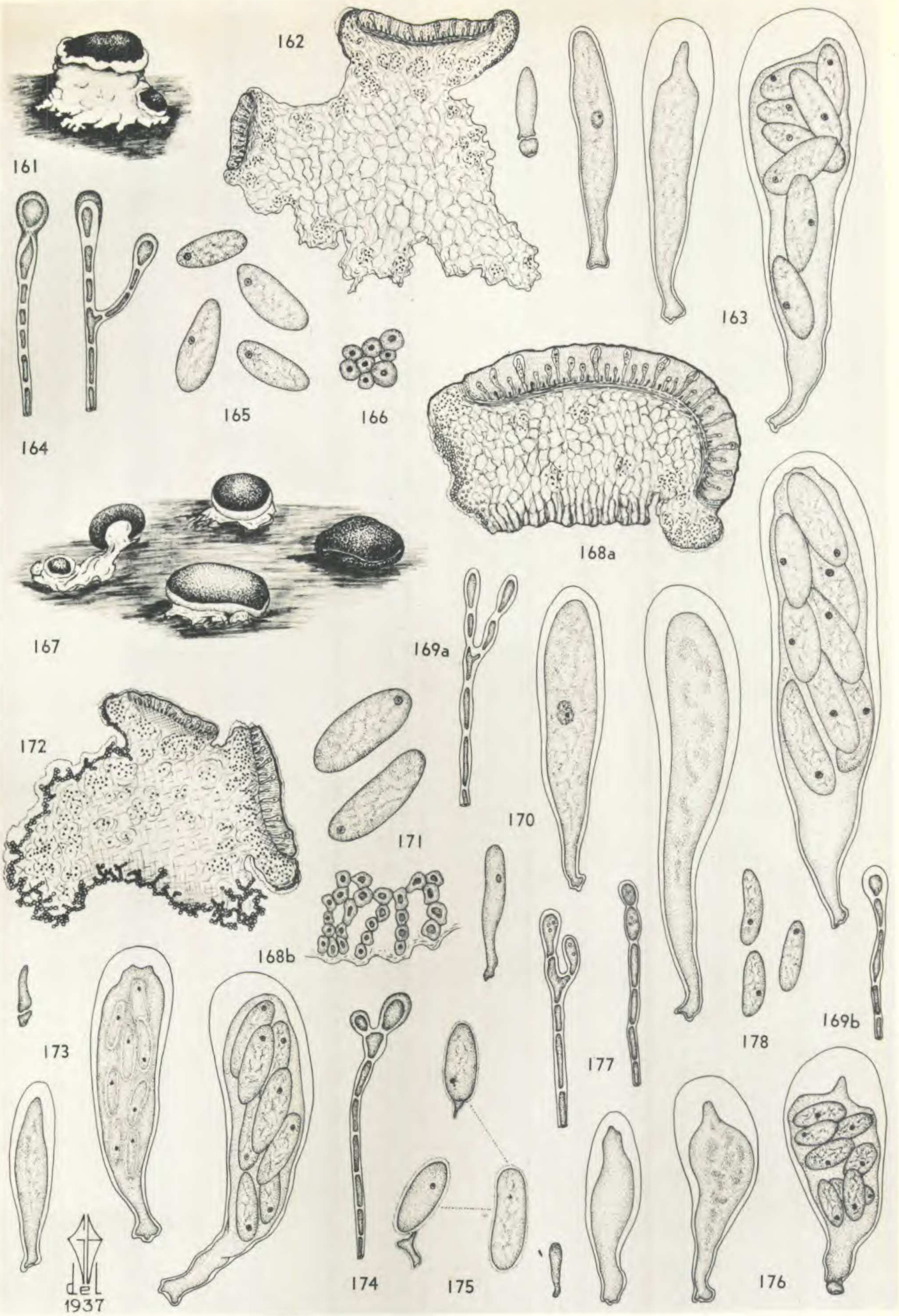

149a
148
147
146
149b
154
151
150
155
152
153
156
157
160
158
159
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 48

Figs. 161–166. *Lecanora lilacinofusca.*
  Fig. 161. Habit sketch of thallus with apothecia. × 20.
  Fig. 162. Section of thallus and apothecia. × 55.
  Fig. 163. Development of ascus through maturity. × 1100.
  Fig. 164. Paraphyses. × 1100.
  Fig. 165. Mature spores. × 1100.
  Fig. 166. Detail of cells from the outer margin adjacent to the apothecium. × 1100.
Figs. 167–171. *Lecanora subolivacea.*
  Fig. 167. Habit sketch of apothecia and thallus. × 35.
  Fig. 168a. Section of apothecium and thallus. × 55.
  Fig. 168b. Detail of thallus margin. × 1100.
  Figs. 169a and b. Paraphyses. × 1100.
  Fig. 170. Development of ascus through maturity. × 1100.
  Fig. 171. Mature spores. × 1100.
Figs. 172–175. *Lecanora fuscobrunnea.*
  Fig. 172. Section through thallus and apothecia. × 55.
  Fig. 173. Development of ascus through maturity. × 1100.
  Fig. 174. Paraphysis. × 1100.
  Fig. 175. Mature spores, some with appendages. × 1100.
Figs. 176–178. *Candelariella albovirens.*
  Fig. 176. Development of ascus through maturity. × 1100.
  Fig. 177. Paraphyses. × 1100.
  Fig. 178. Mature spores. × 1100.


161
162
163
164
165
166
167
168a
169a
170
171
172
168b
173
174
175
176
177
178
169b
del
1937

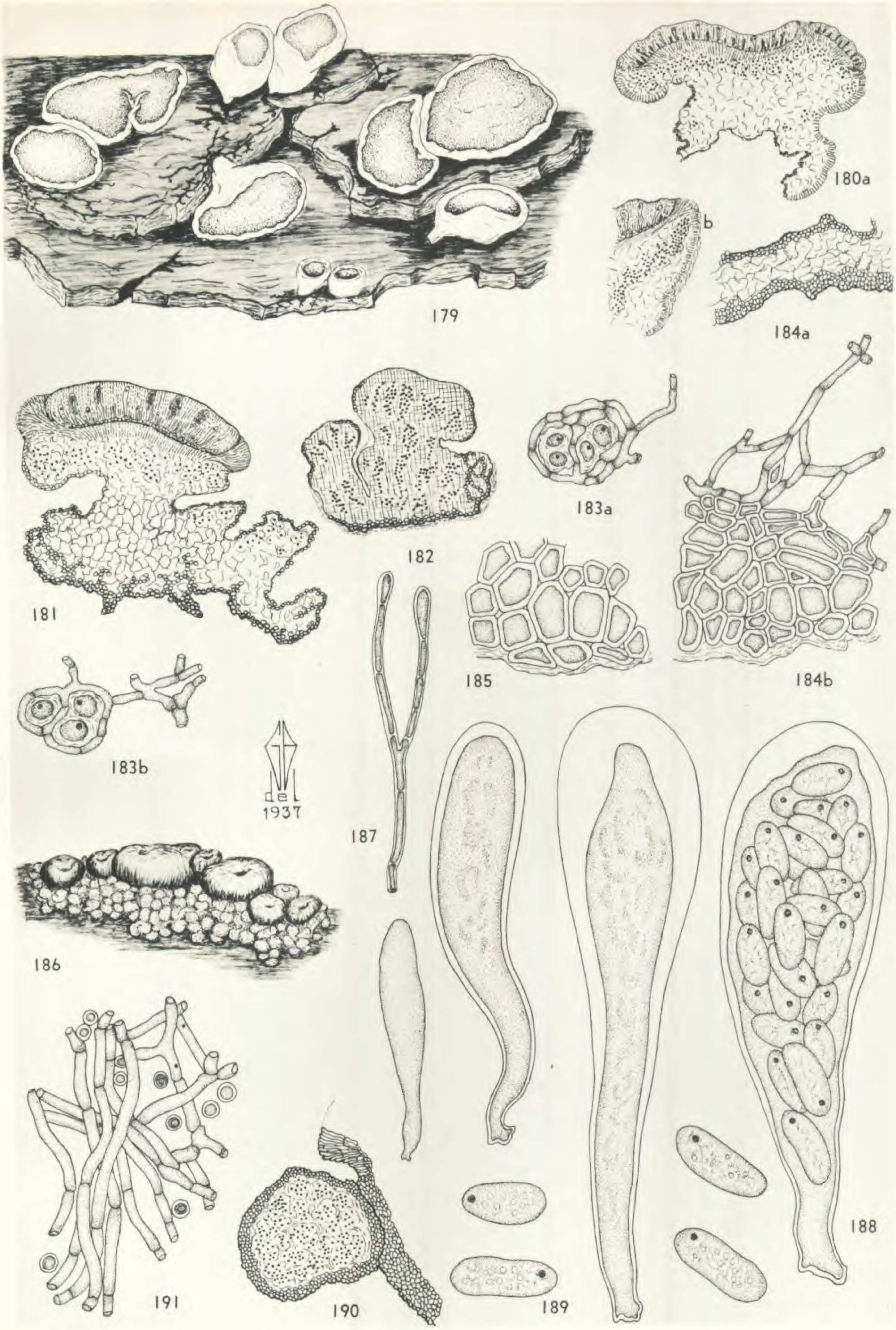
SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 49

Figs. 179–180. *Candelariella albovirens.*
- Fig. 179. Habit sketch of apothecia. × 14.
- Fig. 180a. Section through apothecium and thallus. × 35.
- Fig. 180b. Portion of a section through an apothecium to show especially well-developed thalline margin. × 55.

Figs. 181–191. *Candelariella chrysea.*
- Fig. 181. Section through apothecium and thallus. × 55.
- Fig. 182. Section through assimilative areola. × 55.
- Fig. 183a. Algae surrounded by parasitic hyphae; from an assimilative areola. × 735.
- Fig. 183b. Algae and hyphae from below the apothecium. × 1100.
- Fig. 184a. Non-assimilative thallus. × 55.
- Fig. 184b. Basal cortex of non-assimilative thallus. × 434.
- Fig. 185. Basal cortex of assimilative thallus. × 735.
- Fig. 186. Habit sketch of assimilative thallus with apothecia. × 10.
- Fig. 187. Paraphysis. × 1100.
- Fig. 188. Development of ascus through maturity. × 1100.
- Fig. 189. Mature spores. × 1100.
- Fig. 190. Section through an isidium. × 177.
- Fig. 191. Detail of medullar hyphae. × 434.

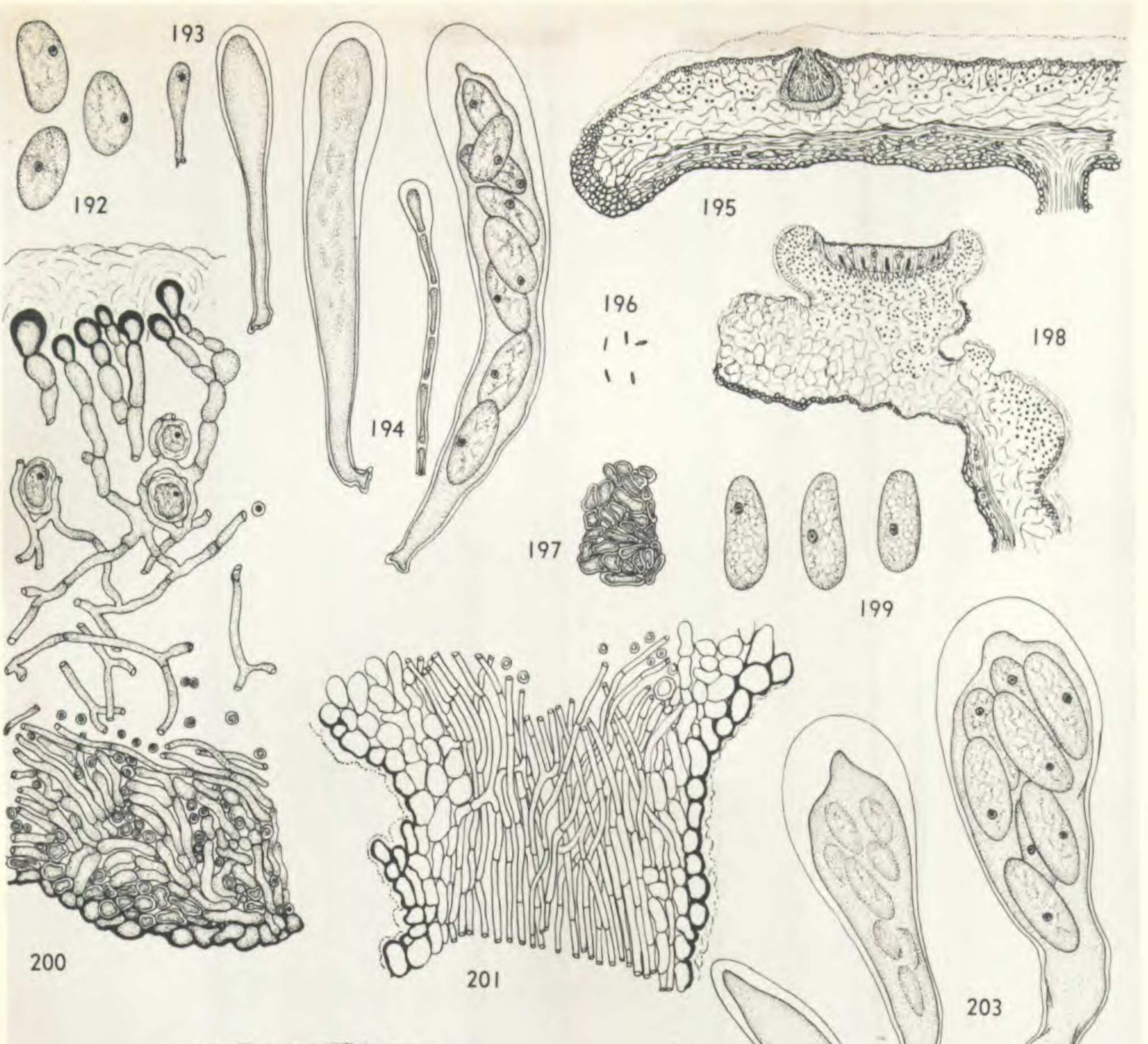

179
180a
b
184a
181
182
183a
185
184b
183b
del
1937
187
186
191
190
189
188

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 50

- Figs. 192–201. *Parmelia variolosa.*
  - Fig. 192. Mature spores. × 1100.
  - Fig. 193. Development of ascus through maturity. × 1100.
  - Fig. 194. Paraphysis. × 1100.
  - Fig. 195. Section of thallus with spermagonium. × 104.
  - Fig. 196. Spermatia. × 1100.
  - Fig. 197. Detail of cells from spermagonium wall. × 1100.
  - Fig. 198. Section through apothecium and thallus. × 55.
  - Fig. 199. Mature spores. × 1100.
  - Fig. 200. Detail of thallus from upper through lower surface. × 434.
  - Fig. 201. Detail of rhizoid. × 434.
- Figs. 202–204. *Parmelia Coreyi.*
  - Fig. 202. Section of thallus and spermagonium. × 55.
  - Fig. 203. Development of ascus through maturity. × 1100.
  - Fig. 204. Paraphysis. × 1100.
- Figs. 205–208. *Parmelia griseola.*
  - Fig. 205. Detail of lower cortex. × 1100.
  - Fig. 206. Section of thallus. × 55.
  - Fig. 207. Detail of cells from surface of rhizoid inwards. × 1100.
  - Fig. 208. Upper cortex and medulla. × 434.

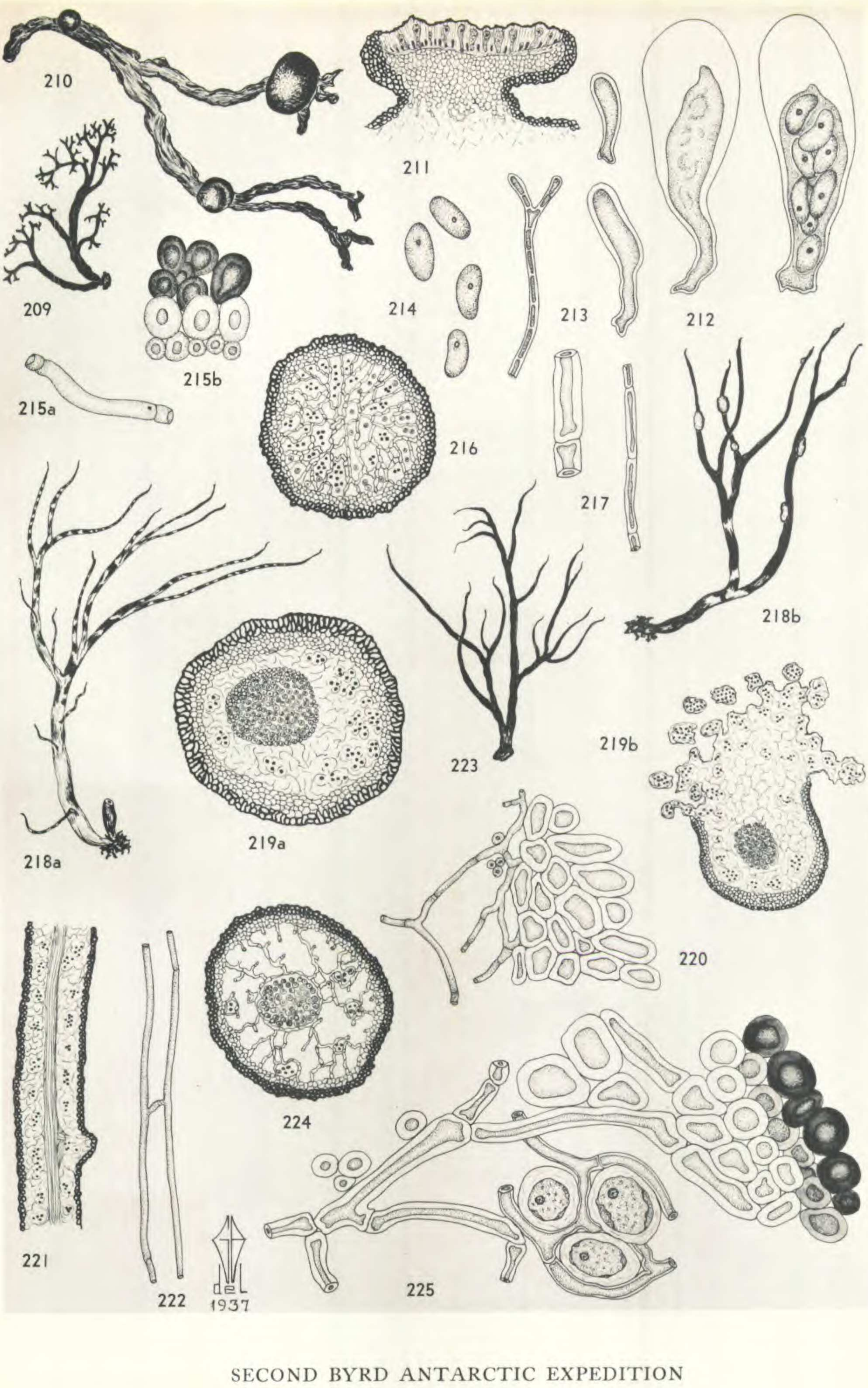

192
193
194
195
196
197
198
199
200
201
202
203
204
del
1937
205
206
207
208

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 51

Figs. 209–216. *Alectoria antarctica.*
  Fig. 209. Habit sketch. × 6.
  Fig. 210. Detail of thallus ends with apothecia. × 35.
  Fig. 211. Section of apothecium. × 55.
  Fig. 212. Development of ascus through maturity. × 1100.
  Fig. 213. Paraphysis. × 1100.
  Fig. 214. Mature spores. × 1100.
  Fig. 215a. Hypha from medulla. × 1100.
  Fig. 215b. Detail of cortex. × 1100.
  Fig. 216. Cross-section of thallus. × 177.
Figs. 217–222. *Usnea antarctica.*
  Fig. 217. Hyphae from medulla. × 1100.
  Fig. 218a. Habit sketch of radiate thallus with alternate dark and light bands. × 2.
  Fig. 218b. Habit sketch of radiate thallus entirely black except for scattered yellow floccose pustules. × 2.
  Fig. 219a. Cross-section of thallus, type illustrated in fig. 218a. × 104.
  Fig. 219b. Cross-section of thallus, type illustrated in fig. 218b. × 55.
  Fig. 220. Detail of medulla and cortex junction. × 1100.
  Fig. 221. Longitudinal-section of thallus, type fig. 218a. × 18.
  Fig. 222. Hyphae from chondroid axis in longtitudinal view. × 1100.
Figs. 223–225. *Usnea frigida.*
  Fig. 223. Habit sketch. × 3.
  Fig. 224. Cross-section of thallus. × 104.
  Fig. 225. Detail of cells from central ''stele'' to cortex. × 1100.


210
211
209
215b
214
213
212
215a
216
217
218b
223
219b
218a
219a
220
221
222
224
225
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

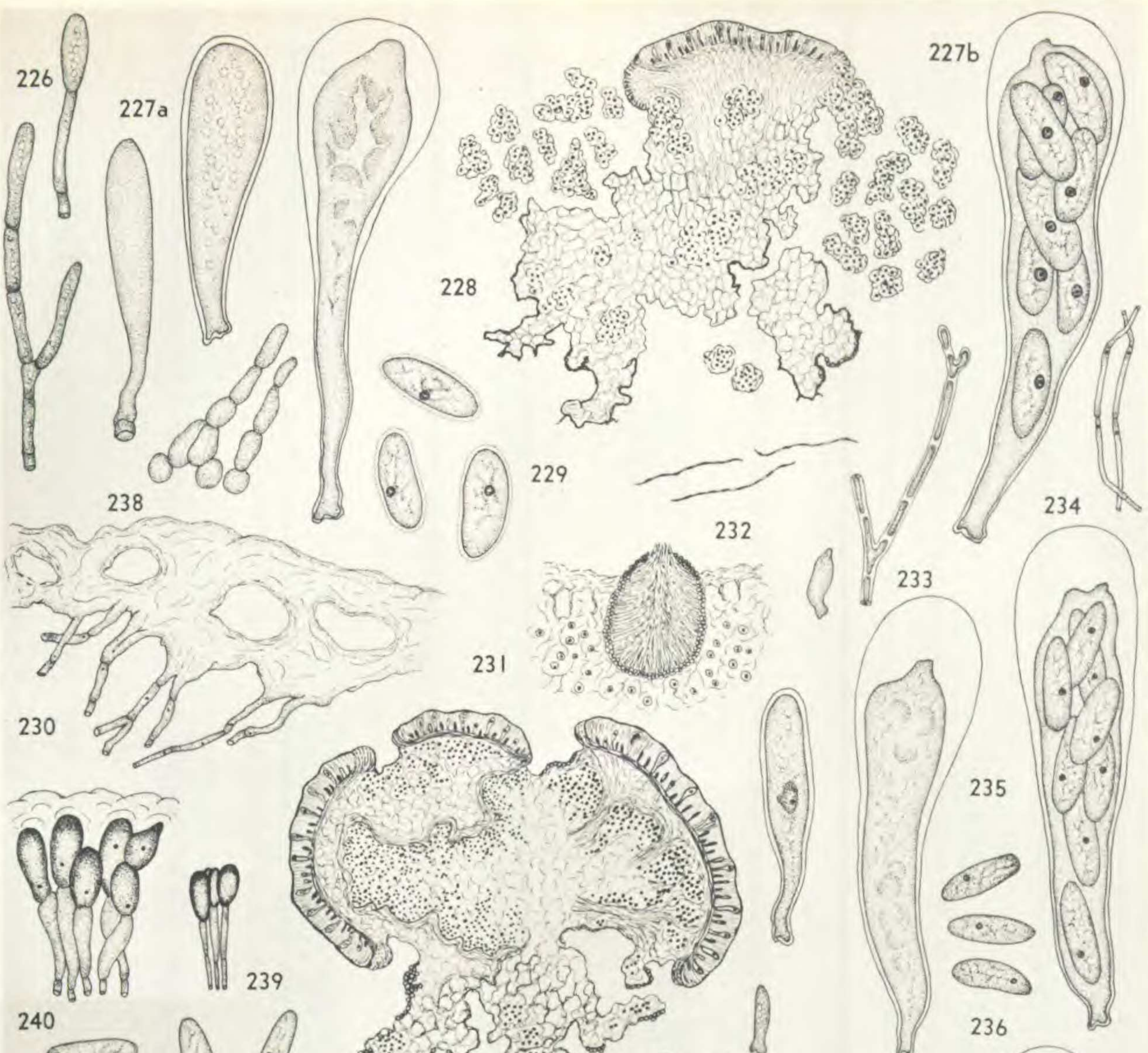
PLATE 52

Figs. 226–229. *Protoblastenia flava.*
  Fig. 226. Paraphyses. × 1100.
  Fig. 227. Development of ascus through maturity. × 1100.
  Fig. 228. Section through thallus and apothecium. × 55.
  Fig. 229. Mature spores. × 1100.

Figs. 230–238. *Protoblastenia aurea.*
  Fig. 230. Detail of decomposed cortex in spermagonial region. × 1100.
  Fig. 231. Detail of spermagonium. × 177.
  Fig. 232. Spermatia. × 1100.
  Fig. 233. Paraphysis. × 1100.
  Fig. 234. Medullar hyphae. × 1100.
  Fig. 235. Development of ascus through maturity. × 1100.
  Fig. 236. Mature spores. × 1100.
  Fig. 237. Section of apothecia and thallus. × 18.
  Fig. 238. Marginal cells. × 1100.

Figs. 239–245. *Protoblastenia alba.*
  Fig. 239. Detail of marginal parathecial cells. × 1100.
  Fig. 240. Detail of marginal thallus cells. × 1100.
  Fig. 241. Mature spores. × 1100.
  Fig. 242. Section of thallus with apothecium. × 55.
  Fig. 243. Paraphysis. × 1100.
  Fig. 244. Development of ascus through maturity. × 1100.
  Fig. 245. Habit sketch of thallus and apothecia in various stages of development. × 14.

Figs. 246–249. *Protoblastenia citrinigricans.*
  Fig. 246. Section through apothecia and thallus. × 35.
  Fig. 247. Paraphysis. × 1100.
  Fig. 248. Development of ascus. × 1100.
  Fig. 249. Mature spores. × 1100.


226
227a
227b
228
229
232
233
234
238
230
231
235
236
237
239
240
241
242
243
244
246
249
245
247
248
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

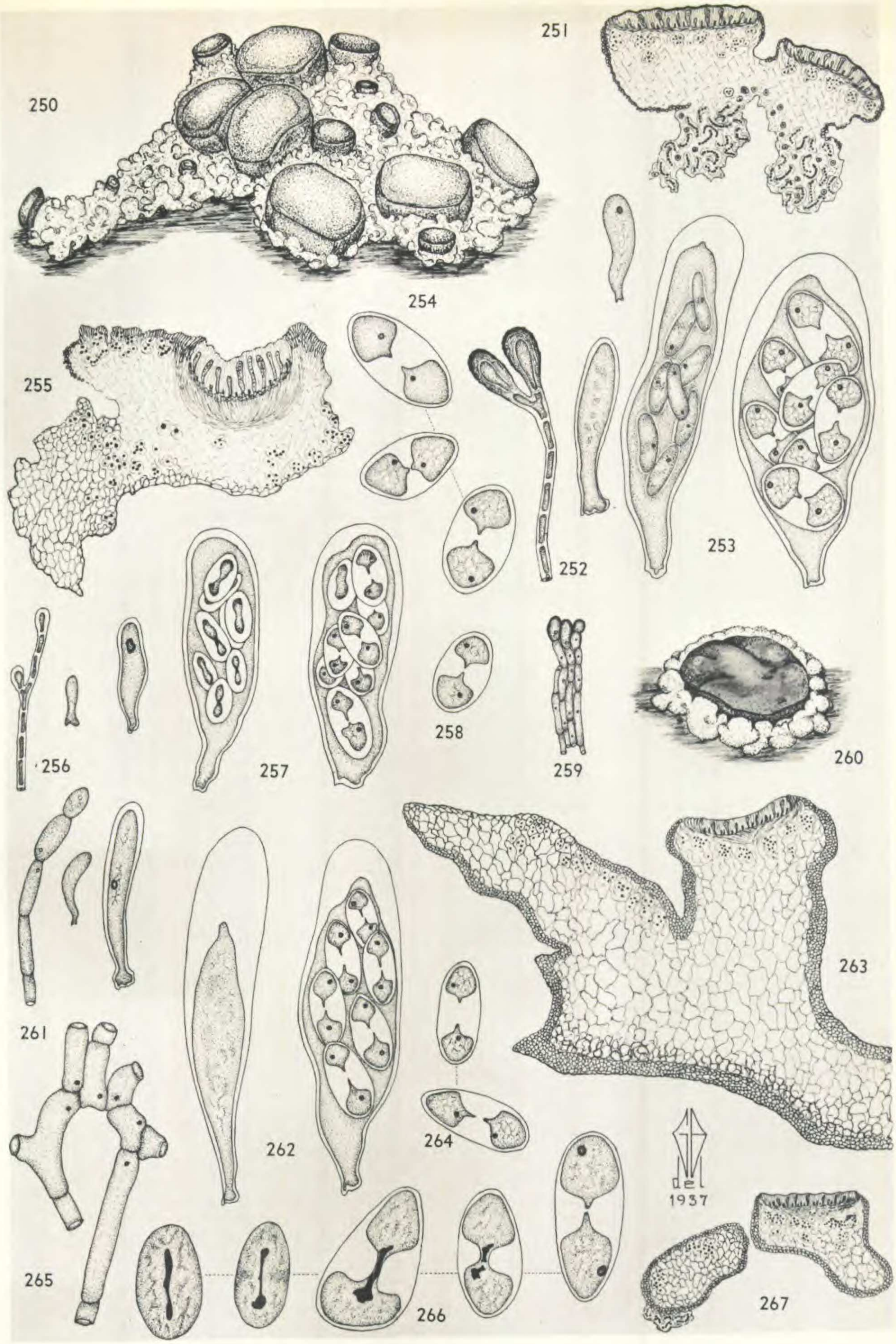
PLATE 53

Figs. 250–254. *Blastenia succinea.*
- Fig. 250. Habit sketch. × 35.
- Fig. 251. Section through apothecia showing associated basal algae. × 55.
- Fig. 252. Paraphysis. × 1100.
- Fig. 253. Development of ascus through maturity. × 1100.
- Fig. 254. Mature spores showing variation in size and shape. × 1100.

Figs. 255–260. *Blastenia grisea.*
- Fig. 255. Section through thallus and apothecium. × 104.
- Fig. 256. Paraphysis. × 1100.
- Fig. 257. Development of ascus through maturity. × 1100.
- Fig. 258. Mature spore. × 1100.
- Fig. 259. Detail from upper marginal cortex of the thallus. × 1100.
- Fig. 260. Habit sketch. × 27.

Figs. 261–266. *Kuttlingeria rufa.*
- Fig. 261. Paraphysis. × 1100.
- Fig. 262. Development of ascus through maturity. × 1100.
- Fig. 263. Section through thallus and apothecium. × 55.
- Fig. 264. Mature spores. × 1100.
- Fig. 265. Medullar hyphae. × 1100.
- Fig. 266. Development of spores showing nuclear-division stages preceding the formation of the mature spore, the latter with two distinct cells, each uninucleate. × 1865.

Fig. 267. *Kuttlingeria rutilans.* Section through thallus lobe and apothecium. × 35.

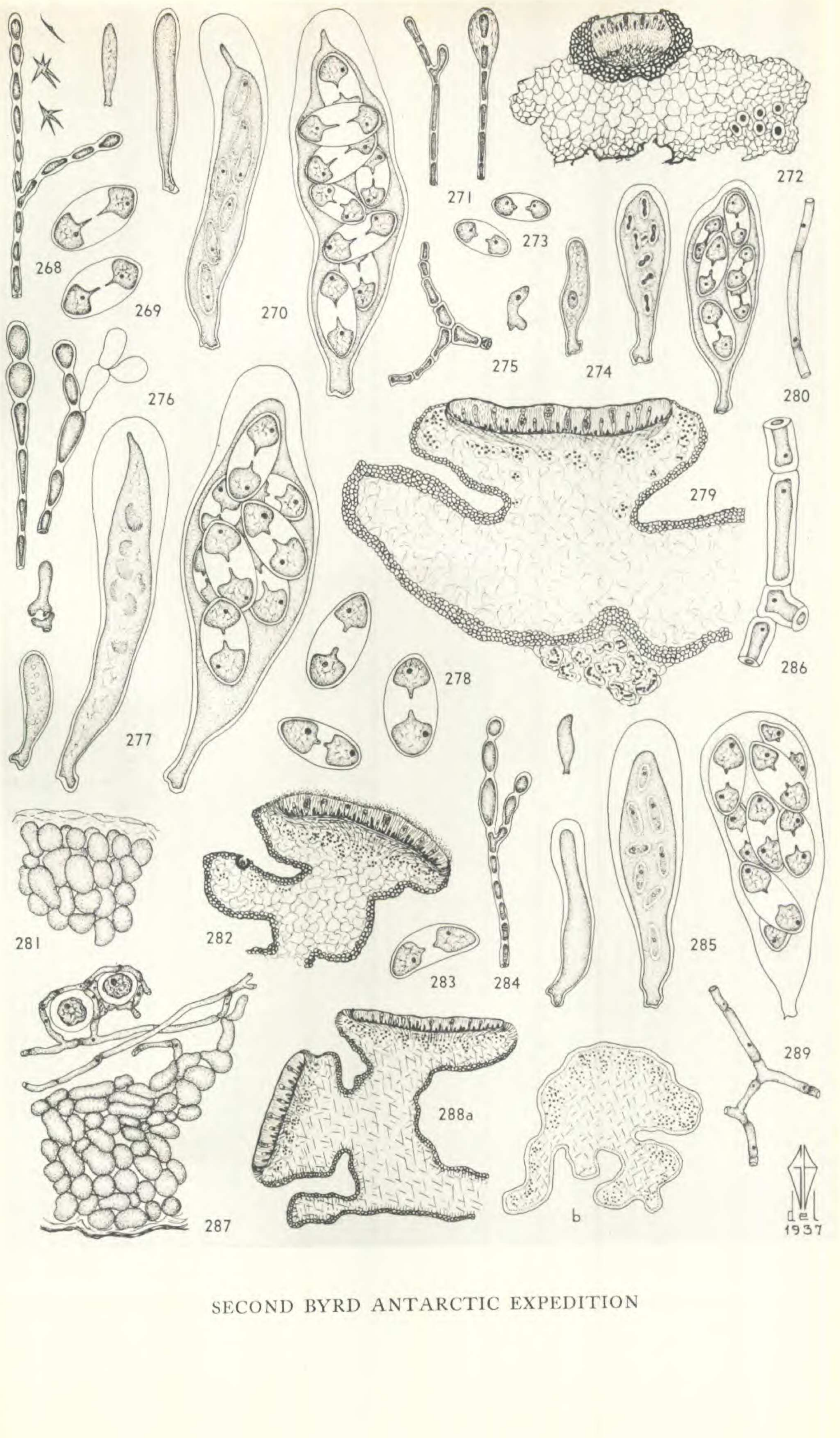

250
251
254
255
252
253
256
257
258
259
260
261
262
263
264
265
266
267
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 54

Figs. 268–270. *Kuttlingeria rutilans.*
  Fig. 268. Paraphysis and crystals from the epithecium. × 1100.
  Fig. 269. Mature spores. × 1100.
  Fig. 270. Development of ascus through maturity. × 1100.
Figs. 271–275. *Huea flava.*
  Fig. 271. Paraphyses. × 1100.
  Fig. 272. Section through thallus and apothecium. × 145.
  Fig. 273. Mature spores. × 1100.
  Fig. 274. Development of ascus through maturity. × 1100.
  Fig. 275. Detail of hyphae from medulla. × 1100.
Figs. 276–280. *Polycauliona pulvinata.*
  Fig. 276. Paraphyses. × 1100.
  Fig. 277. Development of ascus through maturity. × 1100.
  Fig. 278. Mature spores. × 1100.
  Fig. 279. Section through thallus and apothecium. × 55.
  Fig. 280. Detail of medullar hypha. × 1100.
Figs. 281–286. *Polycauliona sparsa.*
  Fig. 281. Detail of upper cortex. × 1100.
  Fig. 282. Section through thallus and apothecium. × 35.
  Fig. 283. Mature spore. × 1100.
  Fig. 284. Paraphysis. × 1100.
  Fig. 285. Development of ascus through maturity. × 1100.
  Fig. 286. Detail of medullar hyphae. × 1100.
Figs. 287–289. *Gasparrinia Siplei.*
  Fig. 287. Detail of lower cortex. × 1100.
  Fig. 288a and b. Section through apothecia and thallus lobe respectively. × 35.
  Fig. 289. Detail of medullar hyphae. × 1100.

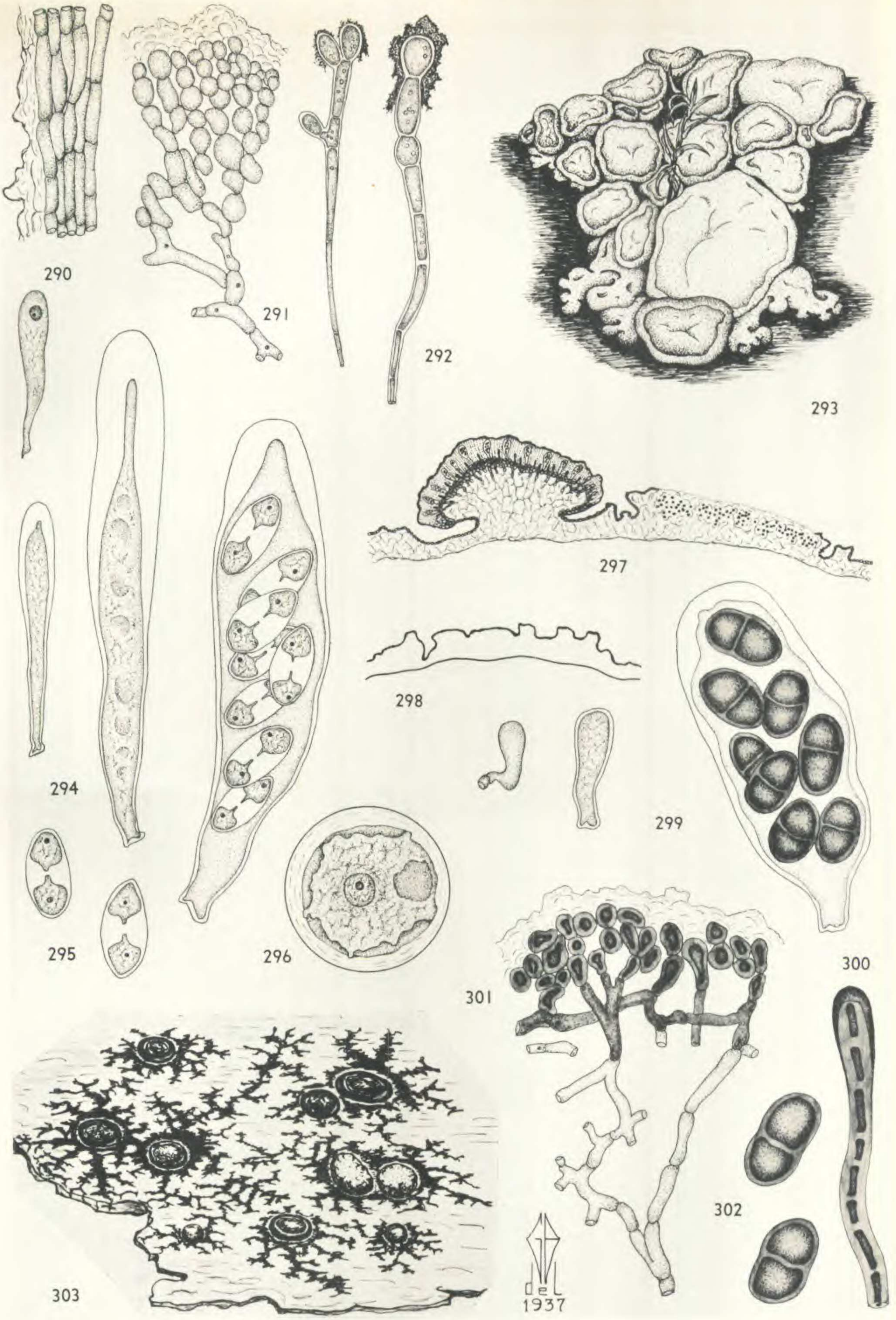

268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288a
b
289
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 55

Figs. 290–296. *Gasparrinia Siplei.*
  Fig. 290. Detail of cells from rhizoidal attachment. × 1100.
  Fig. 291. Detail of upper cortex with decorticating layers. × 1100.
  Fig. 292. Paraphyses. × 1100.
  Fig. 293. Habit sketch. × 14.
  Fig. 294. Development of ascus through maturity. × 1100.
  Fig. 295. Mature spores. × 1100.
  Fig. 296. Alga from thallus. × 1865.
Figs. 297–302. *Buellia flavoplana.*
  Fig. 297. Section through apothecium and assimilative areola. × 35.
  Fig. 298. Section through non-assimilative thallus. × 35.
  Fig. 299. Development of ascus through maturity. × 1100.
  Fig. 300. Paraphysis. × 1100.
  Fig. 301. Detail of non-assimilative areola. × 1100.
  Fig. 302. Mature spores. × 1100.
Fig. 303. *Buellia stellata.* Habit sketch. × 25.

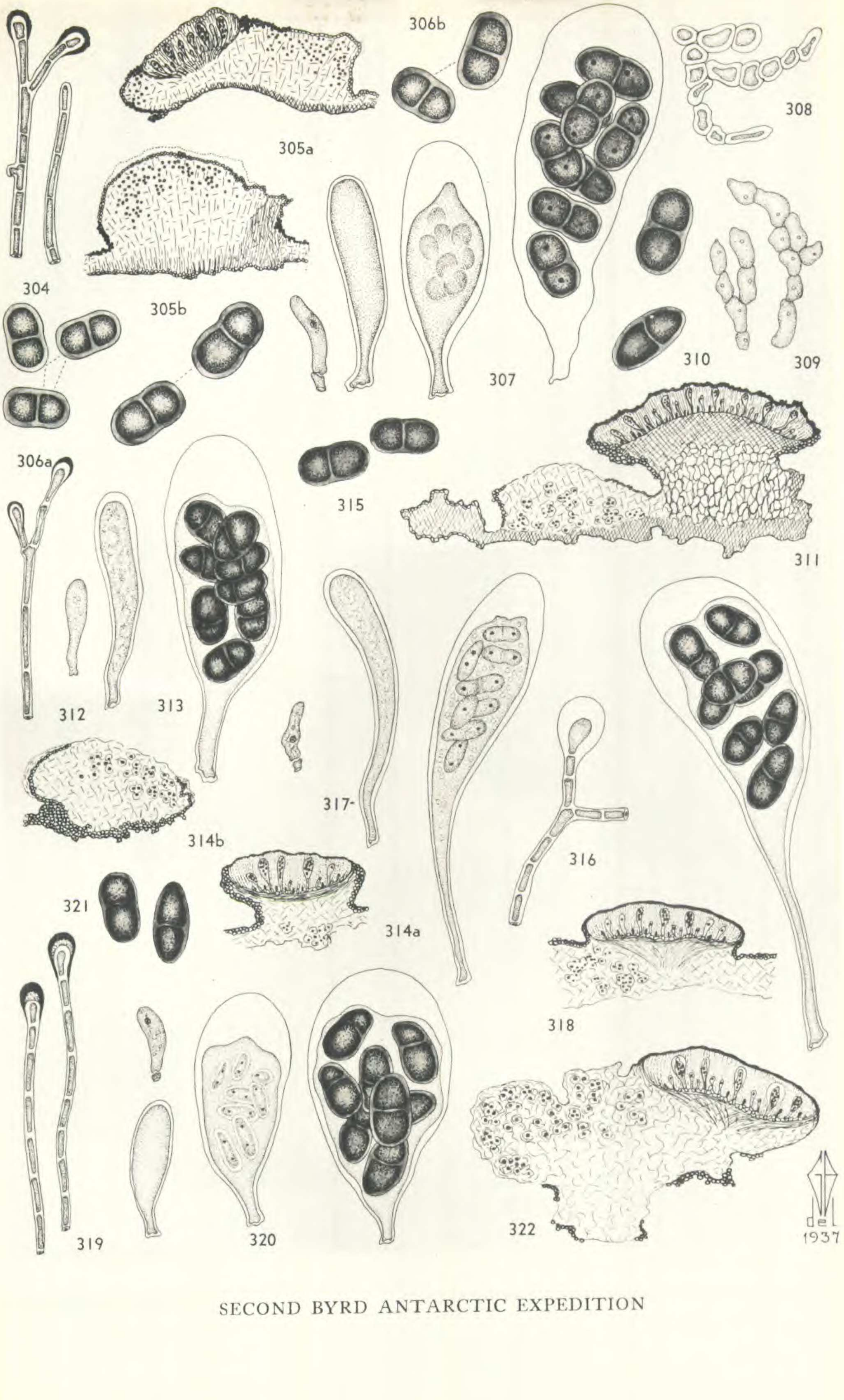

290
291
292
293
294
295
296
297
298
299
300
301
302
303
deL
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 56

Figs. 304–307. *Buellia stellata.*
  Fig. 304. Paraphyses. × 1100.
  Figs. 305a and b. Sections through thalli and apothecium. × 104.
  Figs. 306a and b. Mature spores from various sources. × 1100.
  Fig. 307. Development of ascus through maturity. × 1100.
Figs. 308–311. *Buellia chrysea.*
  Fig. 308. Detail of cells from inner part of non-assimilative thallus. × 1100.
  Fig. 309. Detail of cells from outer surface of non-assimilative thallus. × 1100.
  Fig. 310. Mature spores. × 1100.
  Fig. 311. Section through non-assimilative, assimilative thalli, and apothecium. × 55.
Figs. 312–315. *Buellia brunnescens.*
  Fig. 312. Paraphysis. × 1100.
  Fig. 313. Development of ascus through maturity. × 1100.
  Figs. 314a and b. Sections through apothecium and assimilative thallus. × 104.
  Fig. 315. Mature spores. × 1100.
Figs. 316–317. *Buellia chrysea.*
  Fig. 316. Paraphysis. × 1100.
  Fig. 317. Development of ascus through maturity. × 1100.
Figs. 318–321. *Buellia pallida.*
  Fig. 318. Section through thallus and apothecium. × 104.
  Fig. 319. Paraphysis. × 1100.
  Fig. 320. Development of ascus through maturity. × 1100.
  Fig. 321. Mature spores. × 1100.
Fig. 322. *Buellia alboradians.* Section through thallus and apothecium. × 177.

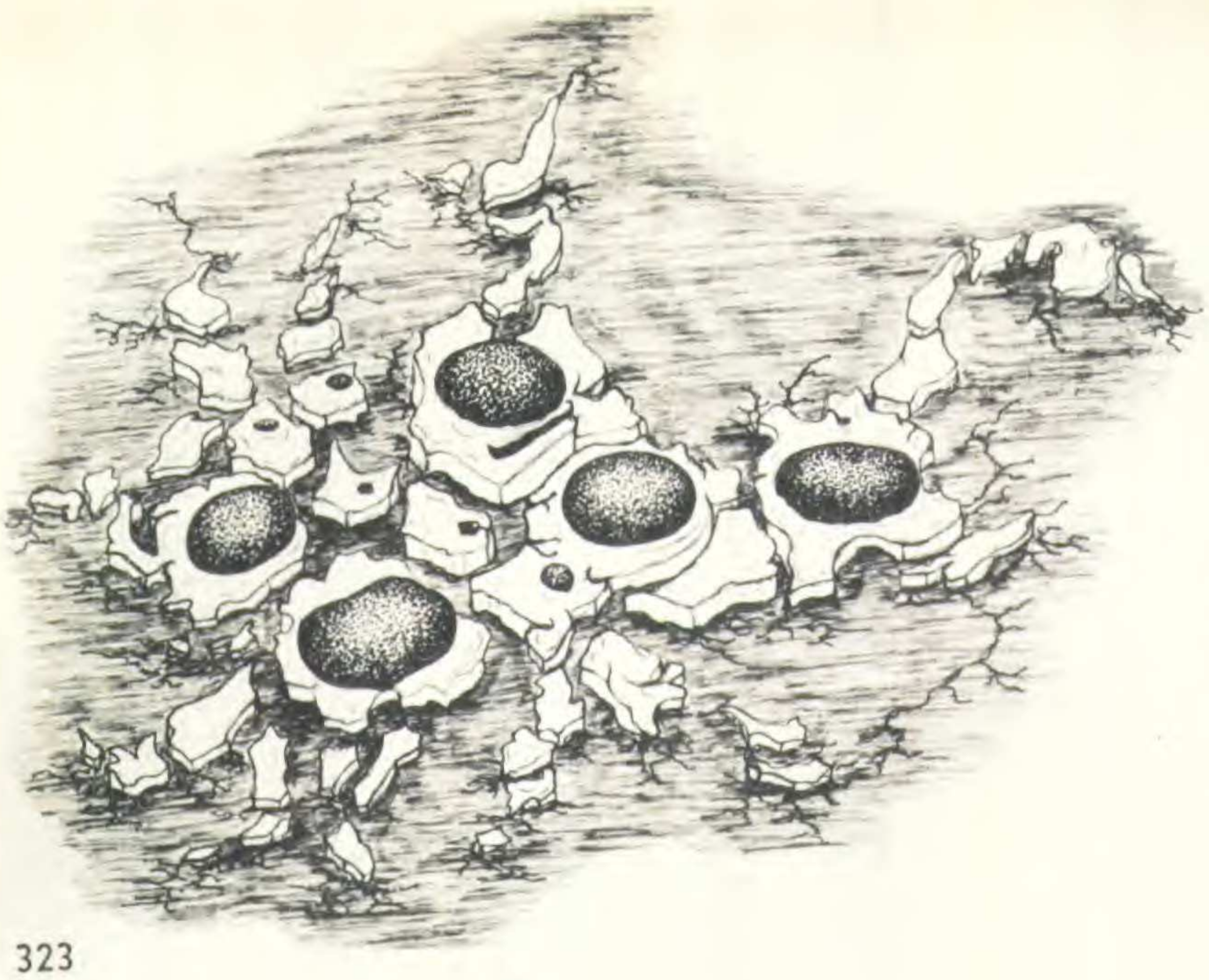

306b
308
305a
304
305b
310
309
307
306a
315
311
312
313
317
314b
316
321
314a
318
319
320
322
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

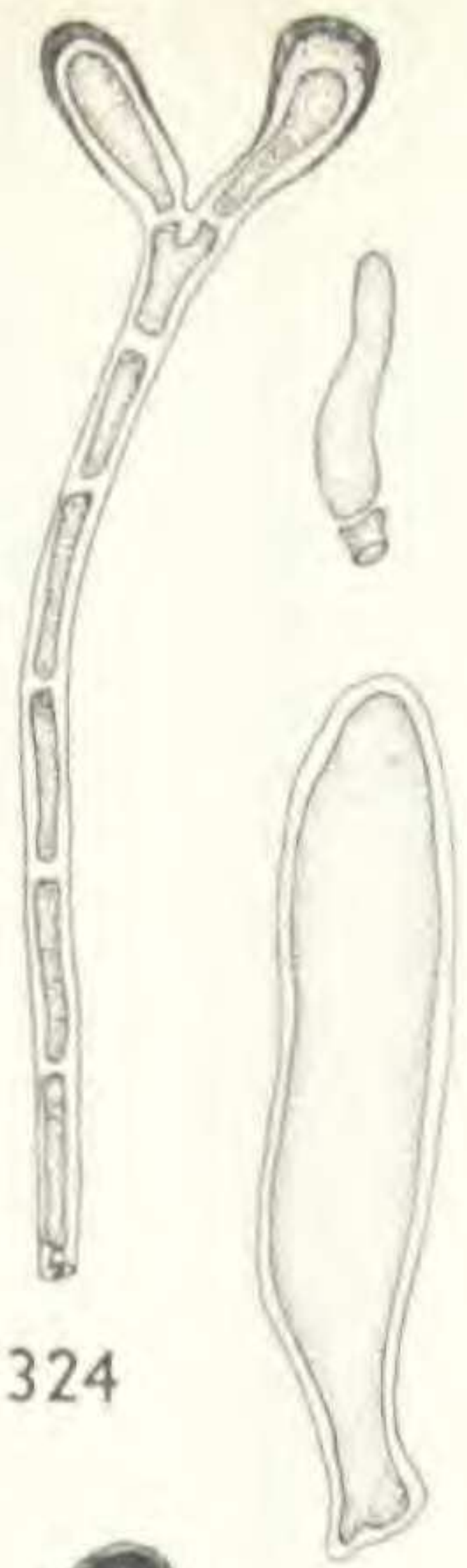
EXPLANATION OF PLATE

PLATE 57

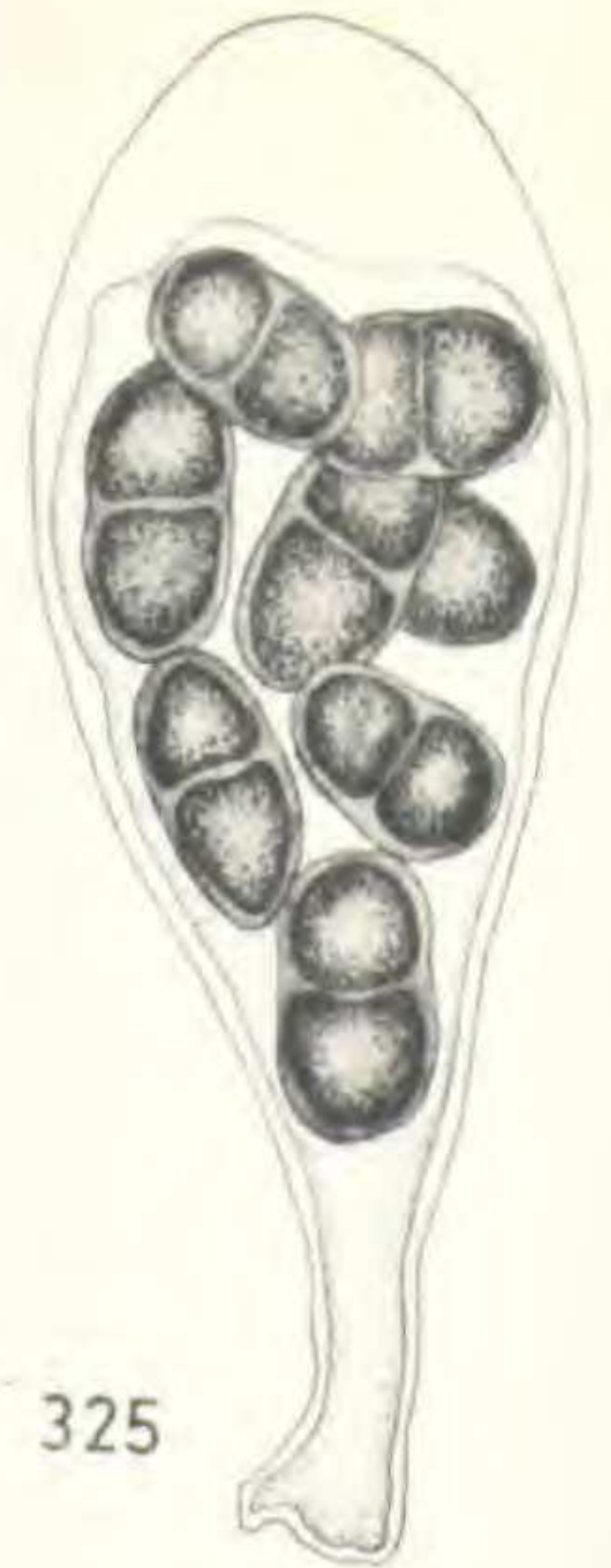
- Figs. 323–326. *Buellia alboradians.*
  - Fig. 323. Habit sketch. × 35.
  - Fig. 324. Paraphysis. × 1100.
  - Fig. 325. Development of ascus through maturity. × 1100.
  - Fig. 326. Mature spores. × 1100.
- Figs. 327–332. *Buellia frigida.*
  - Fig. 327. Paraphyses. × 1100.
  - Fig. 328. Development of ascus through maturity. × 1100.
  - Fig. 329. Section through assimilative thallus. × 55.
  - Fig. 330. Section through darkened assimilative thallus at margin of plant. × 55.
  - Fig. 331. Section through apothecium. × 55.
  - Fig. 332. Mature spores. × 1100.
- Figs. 333–334. *Buellia floccosa.*
  - Fig. 333. Section through thallus and apothecium. × 55.
  - Fig. 334. Detail of outer cortex. × 434.
- Fig. 335. *Buellia frigida.* Habit sketch. × 20.



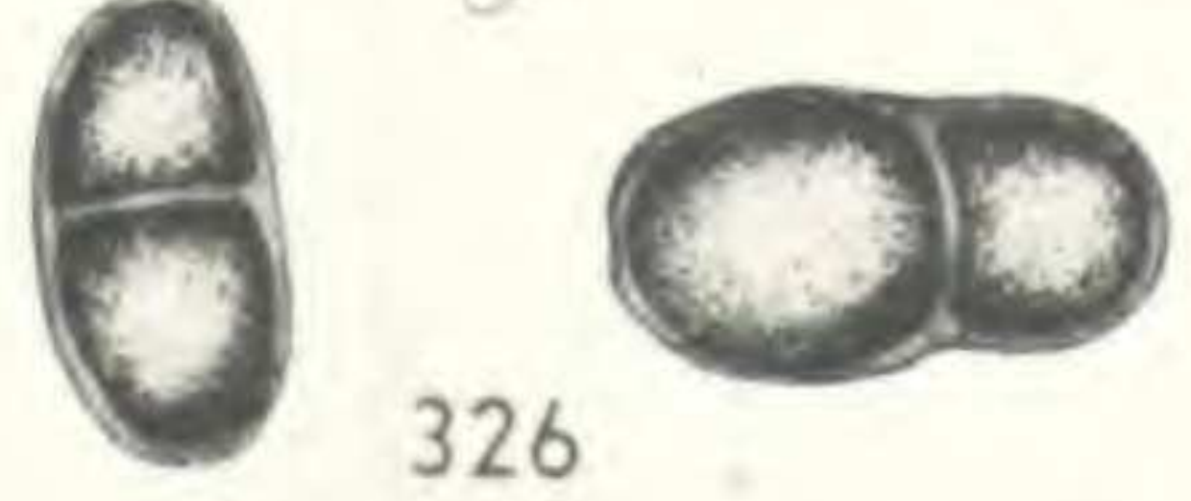
323



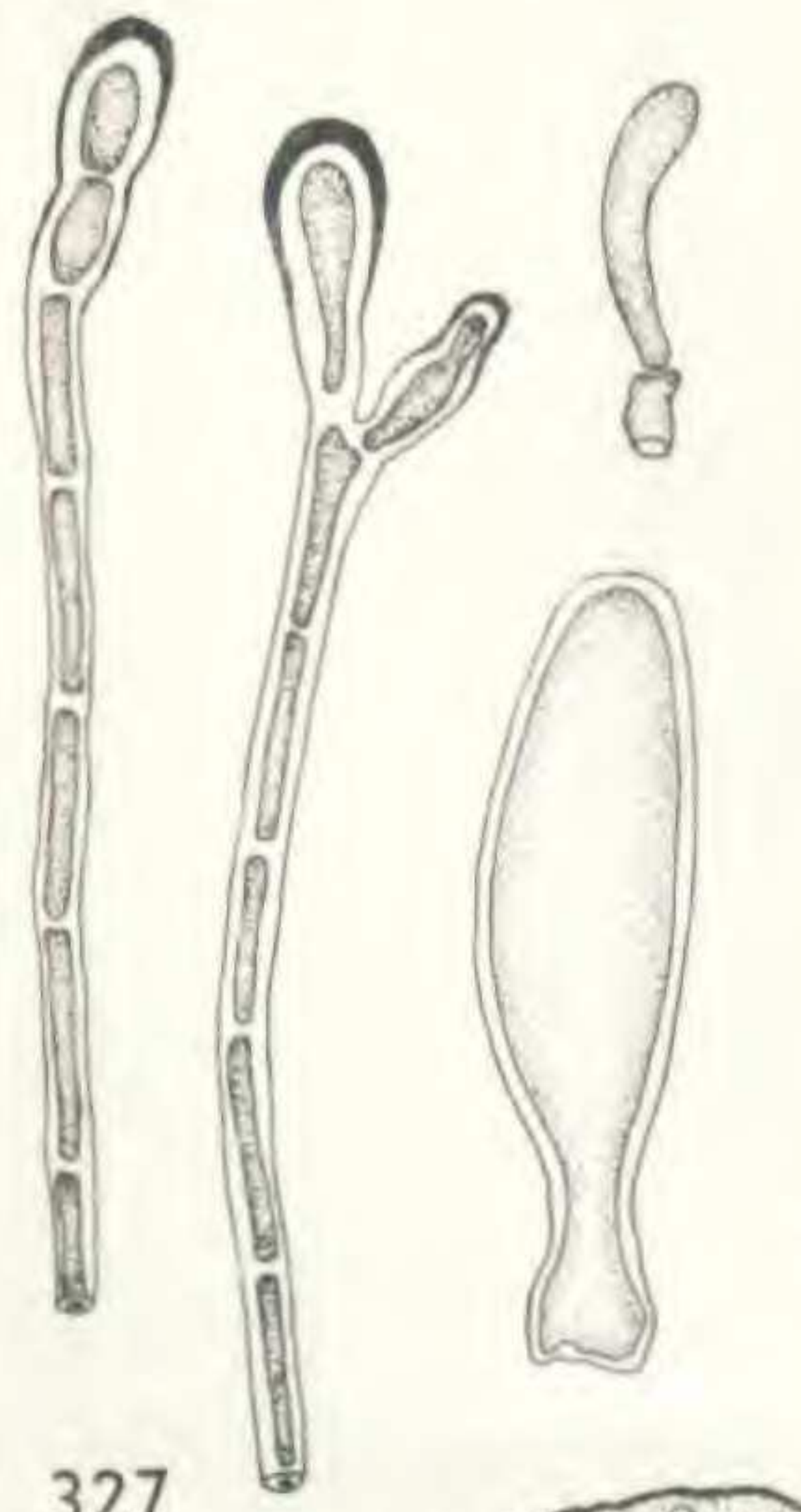
324



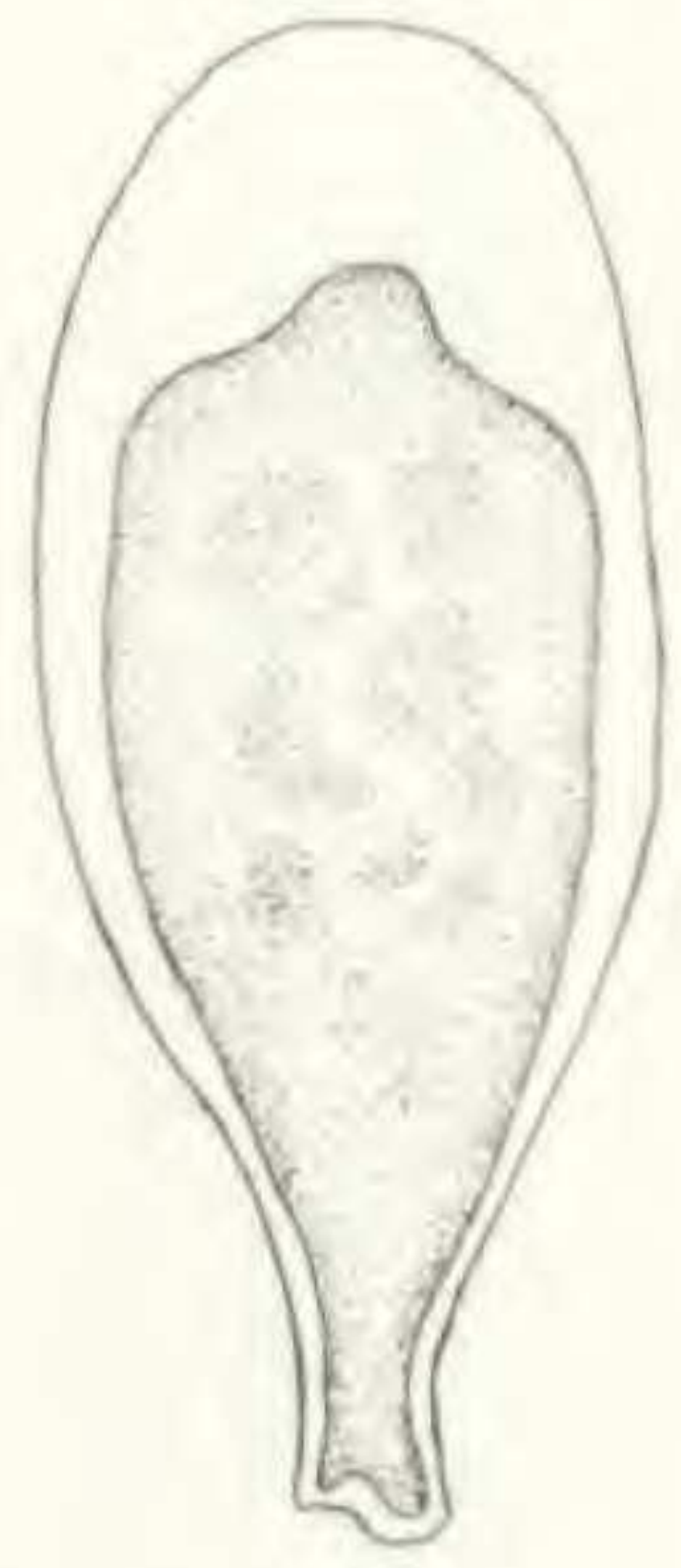
325



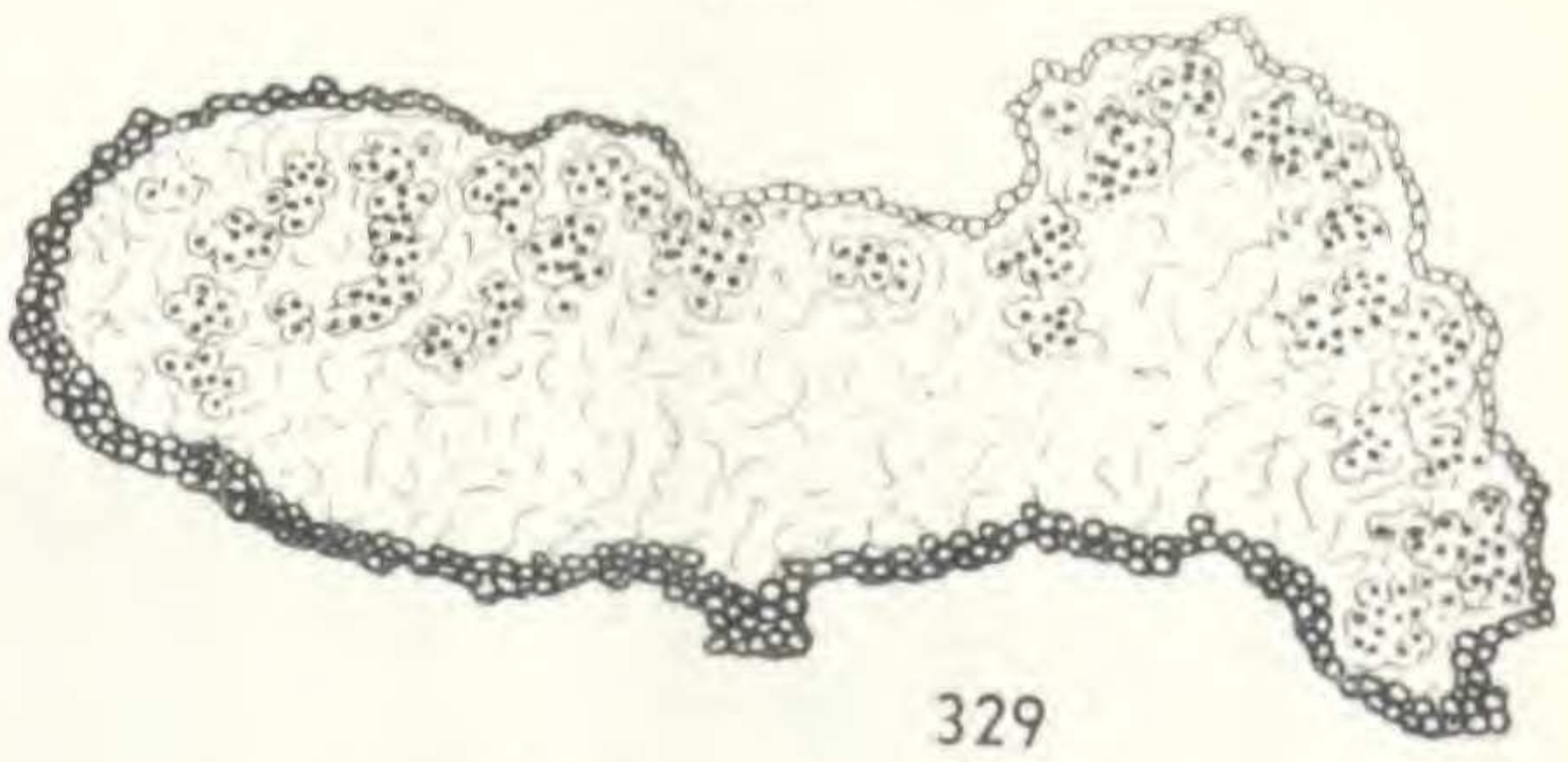
326



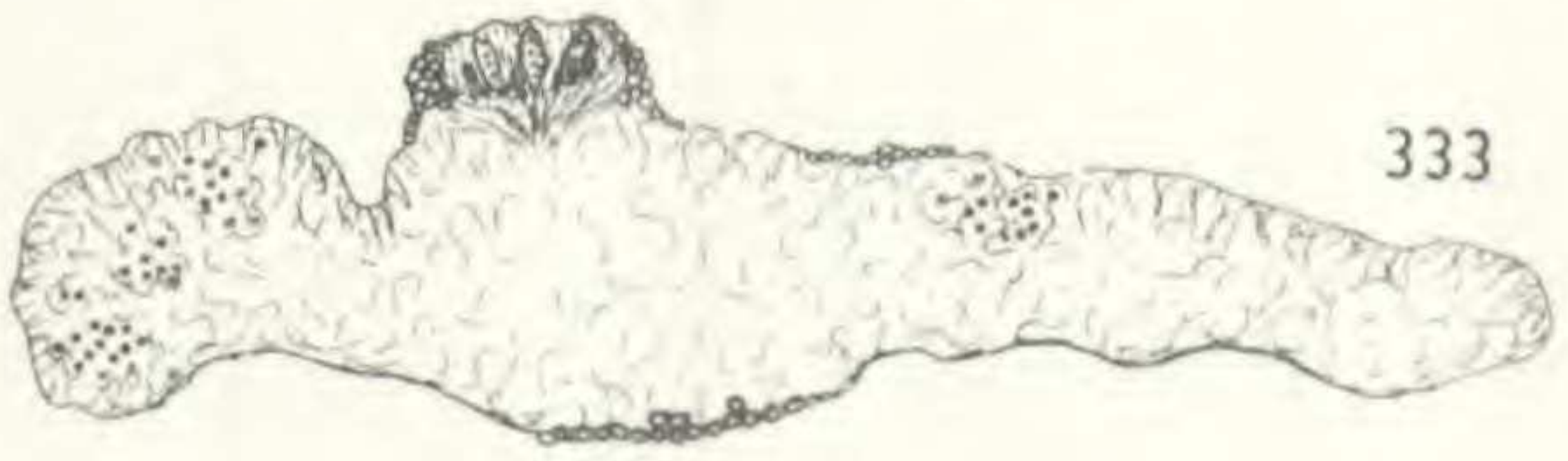
327



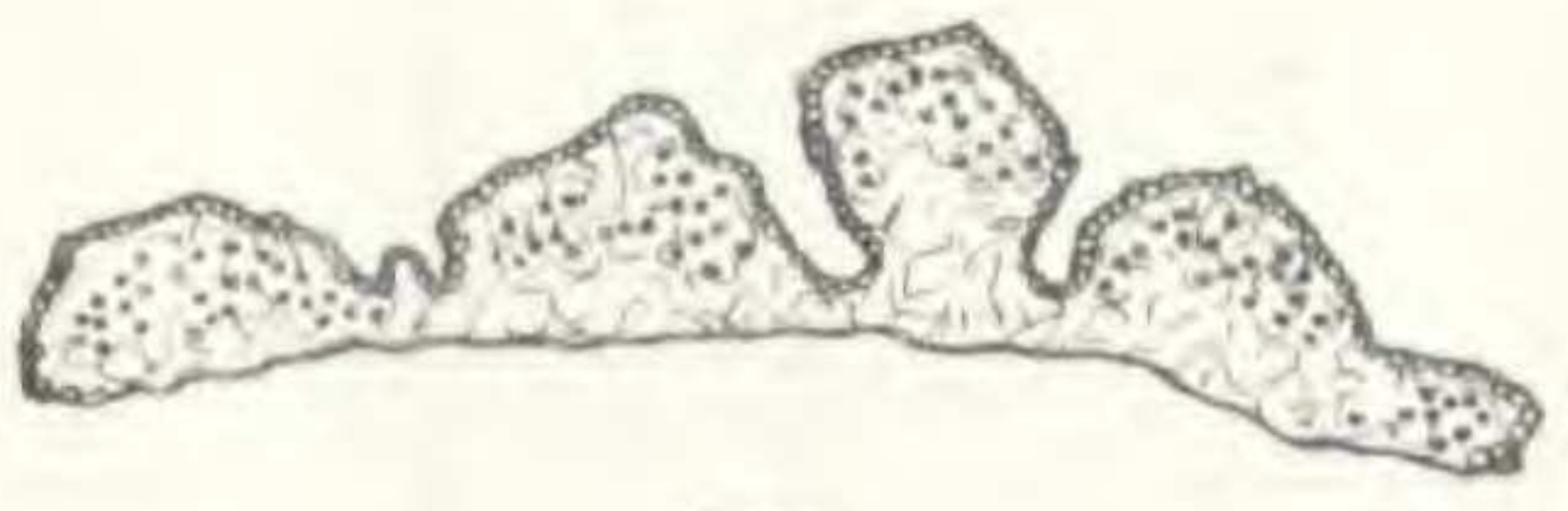
328



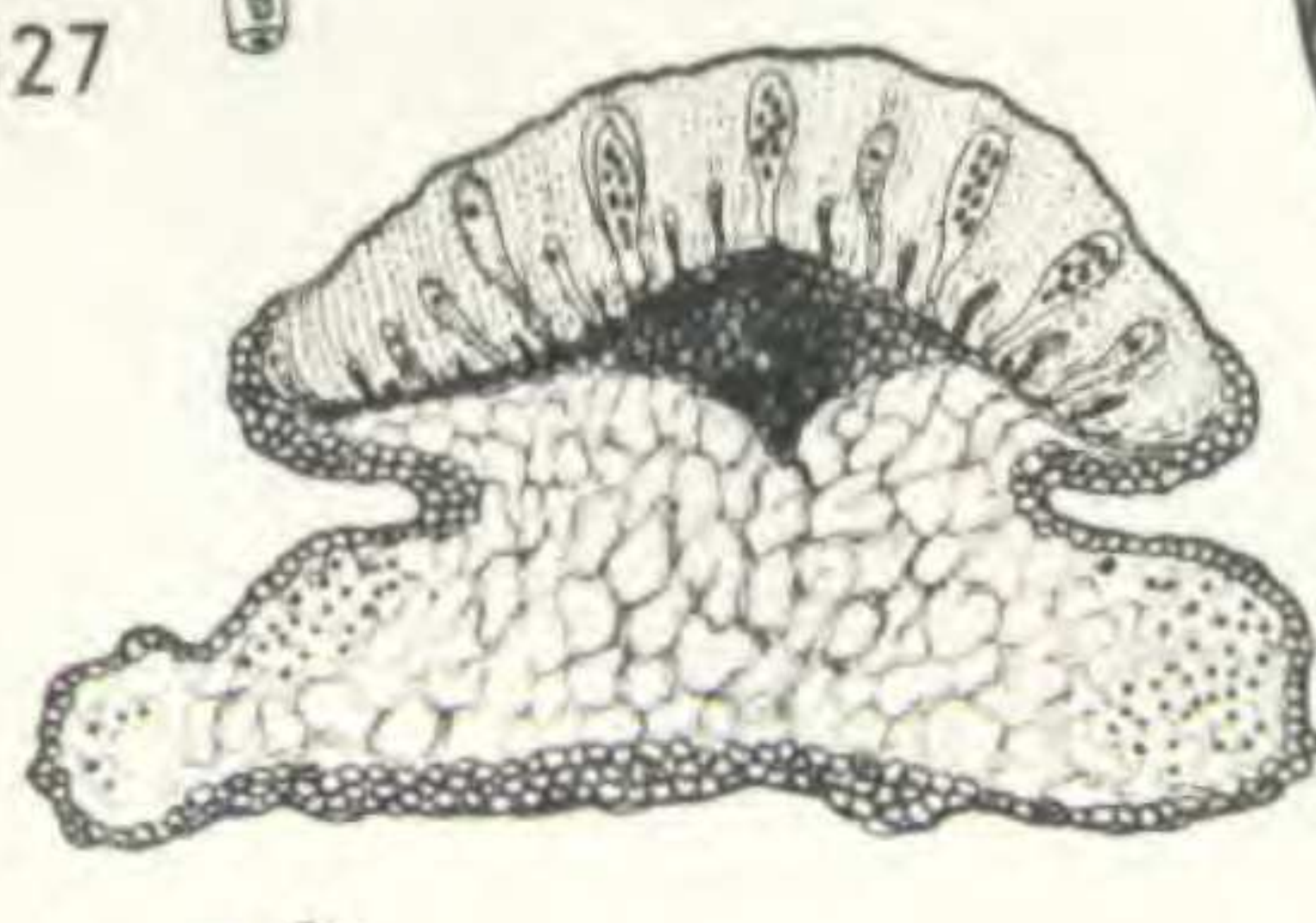
329



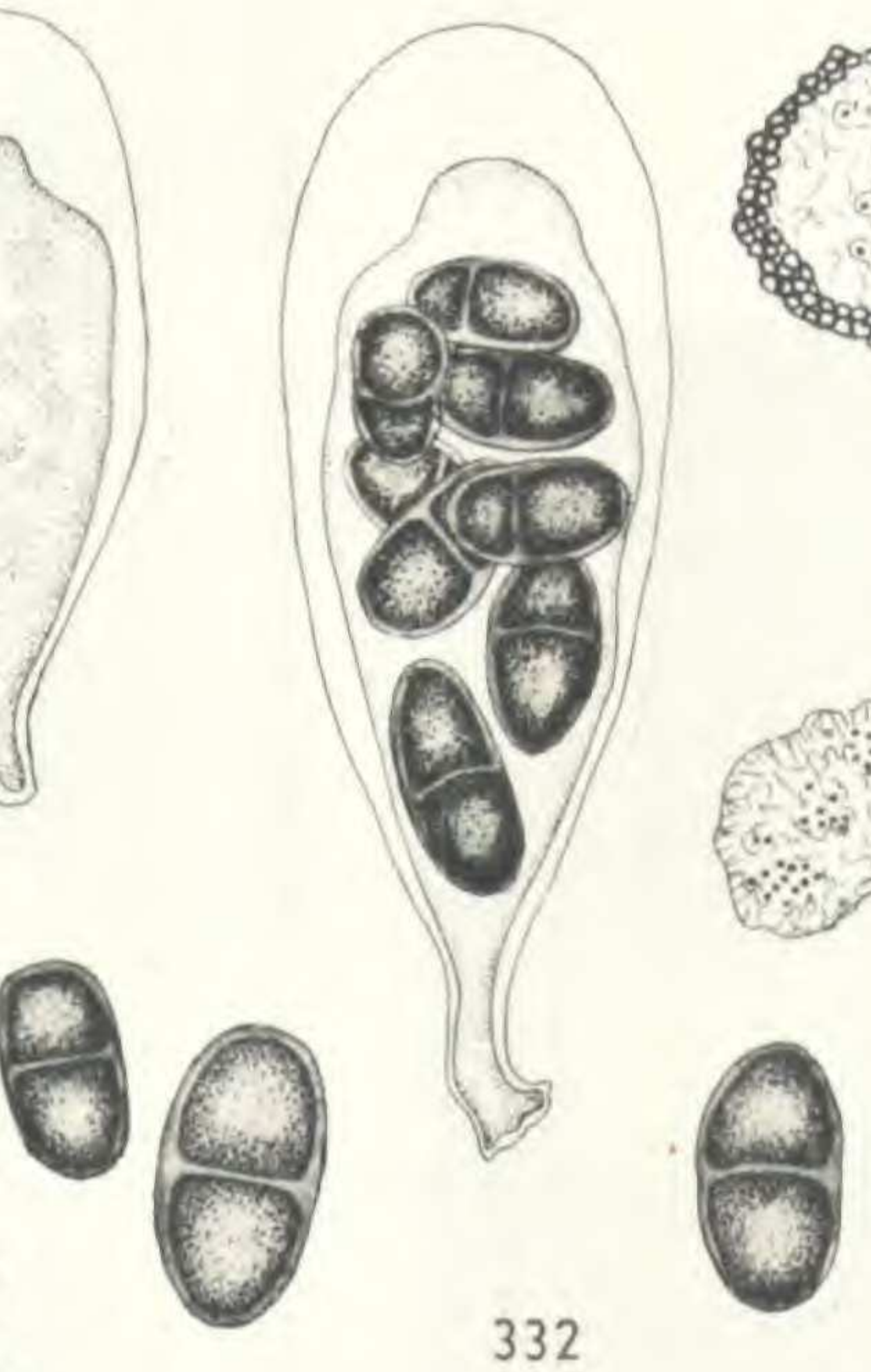
333



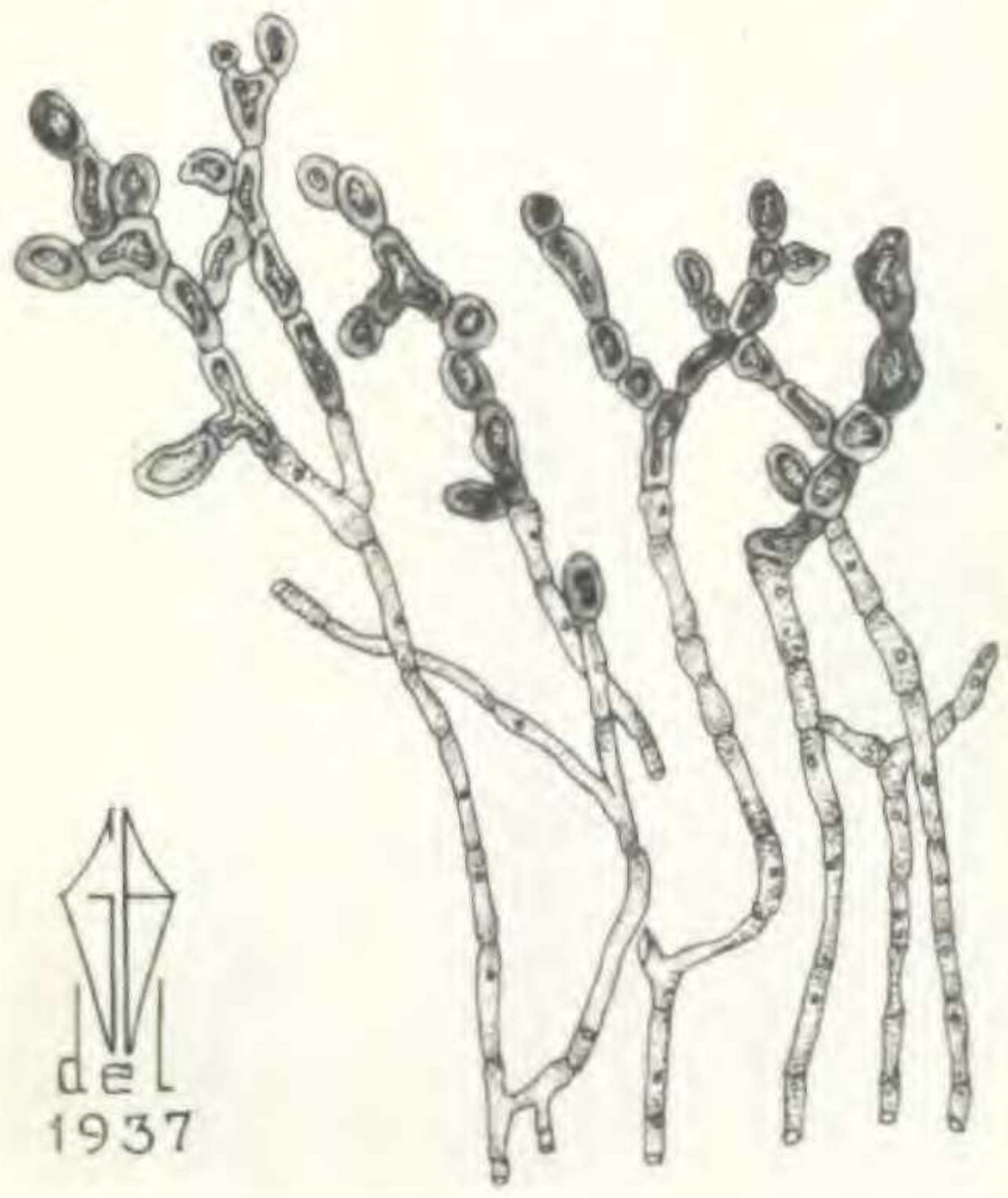
330



331

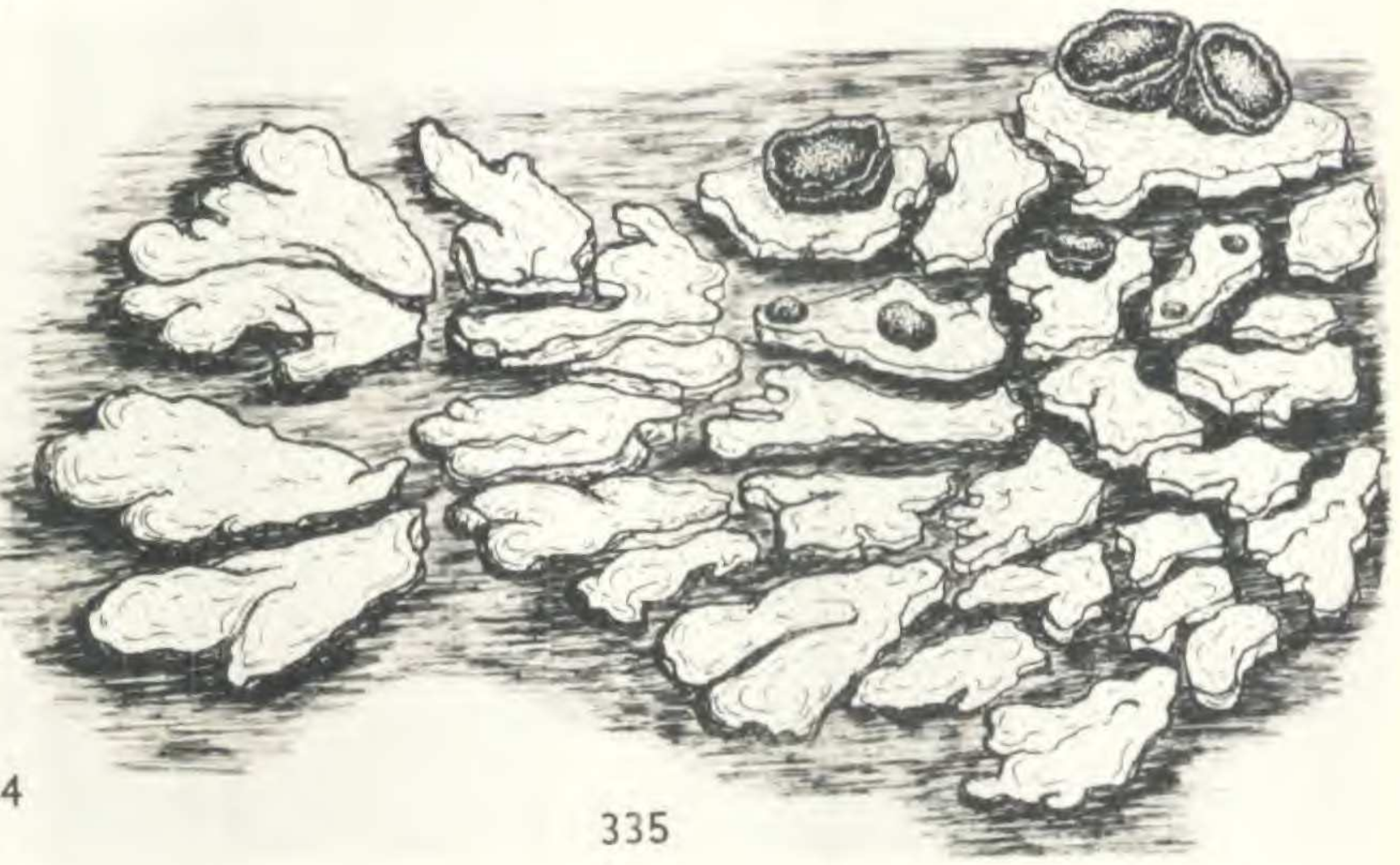


332



del
1937

334



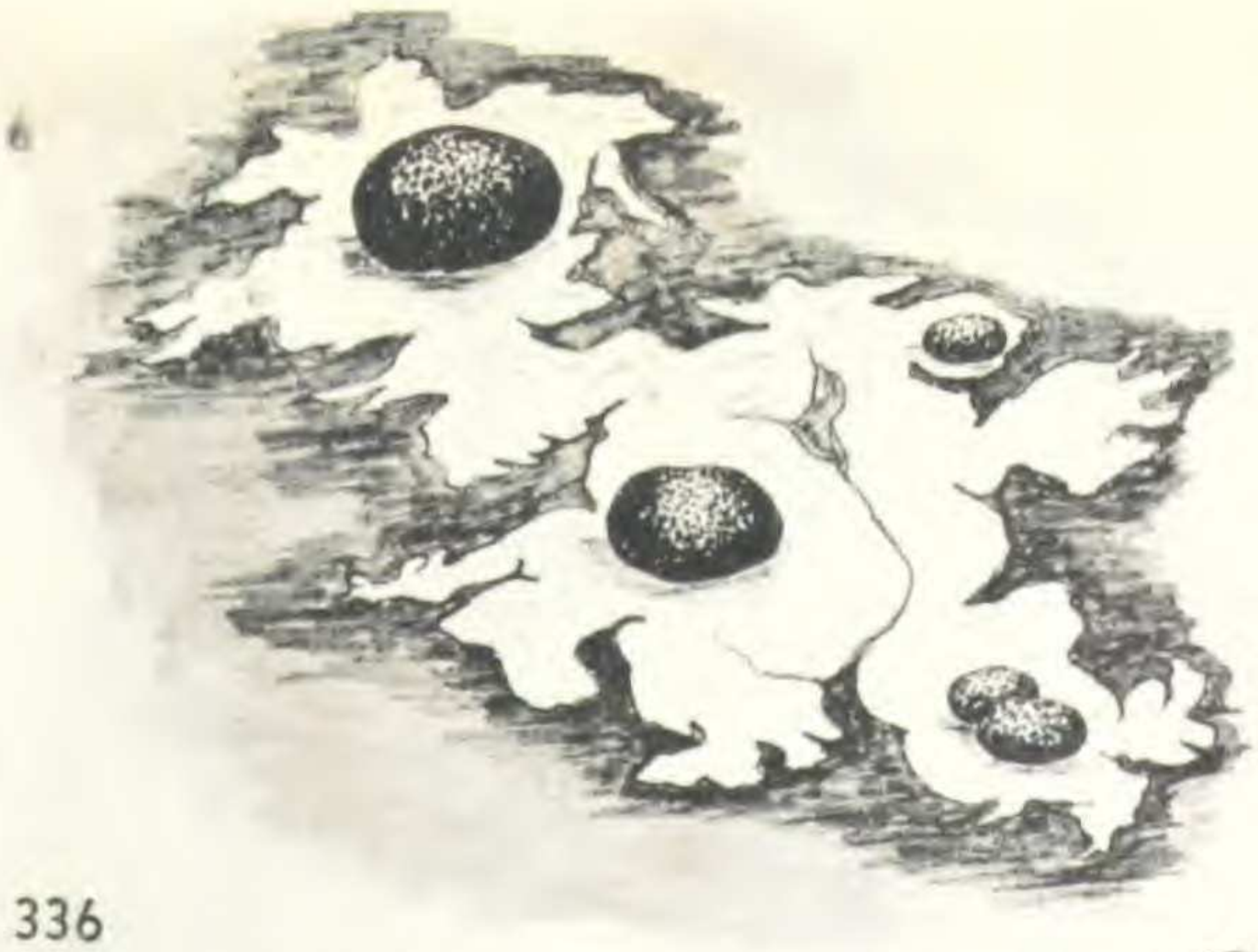
335

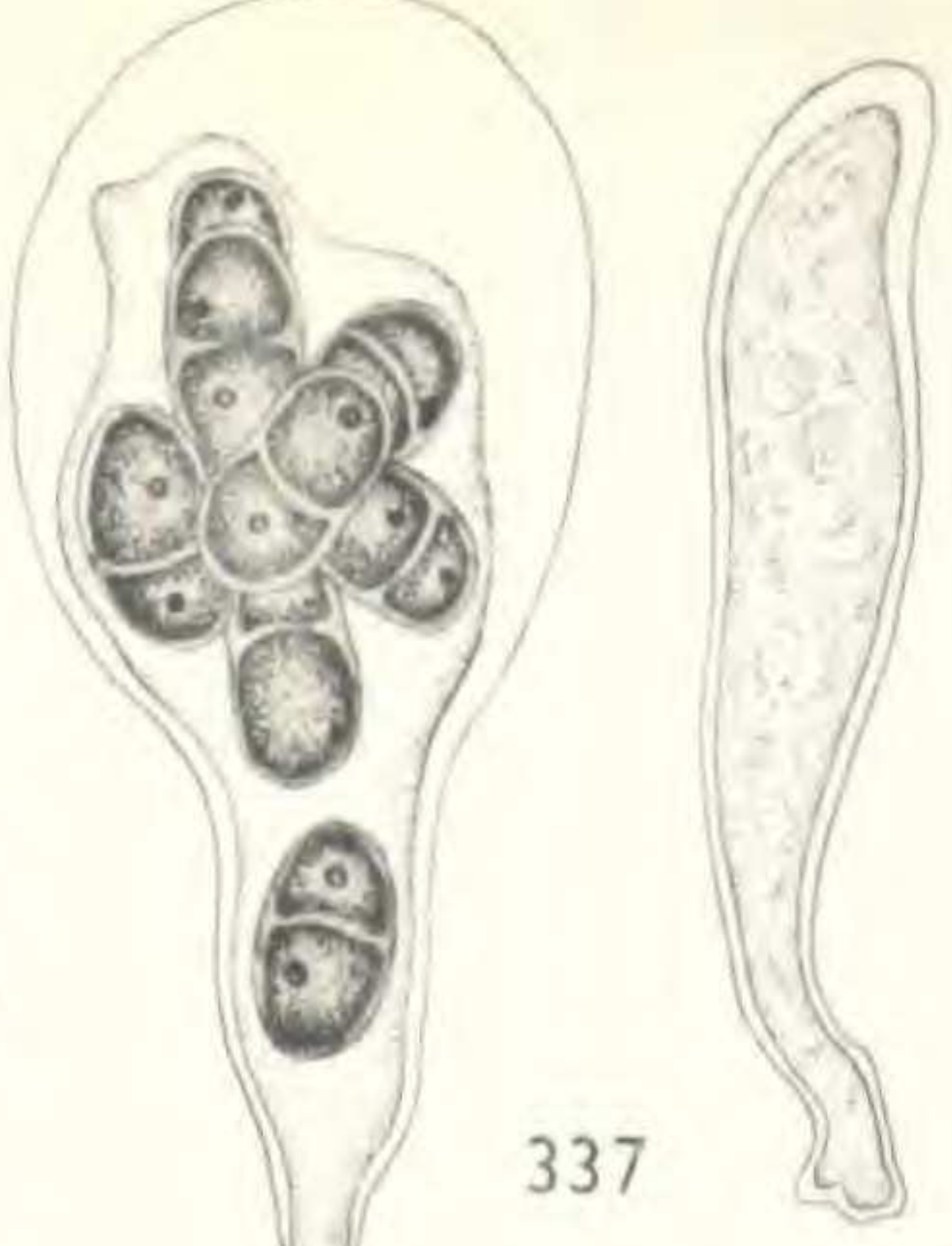
SECOND BYRD ANTARCTIC EXPEDITION

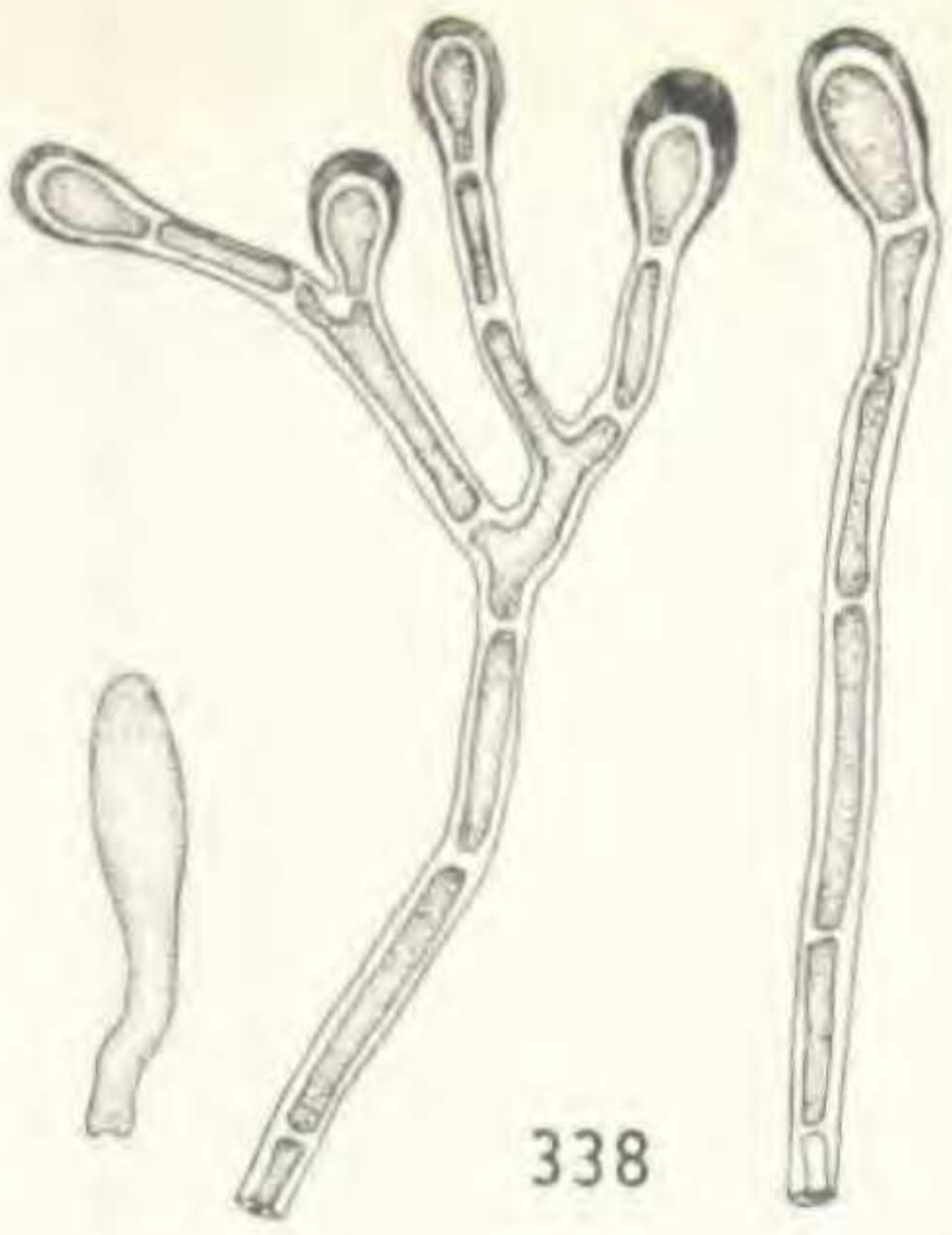
EXPLANATION OF PLATE

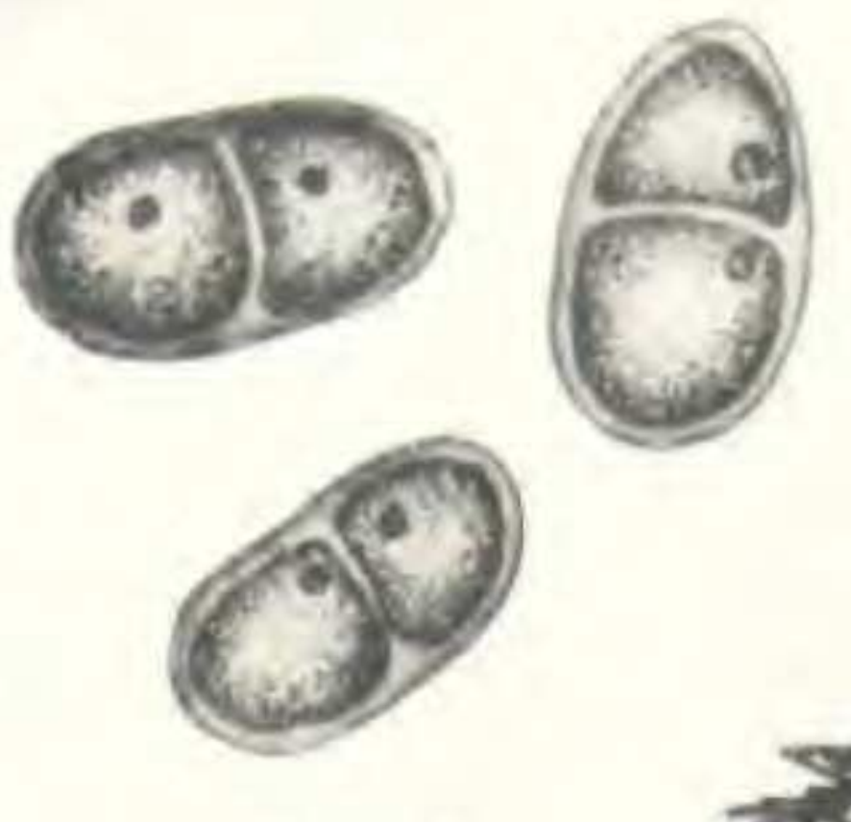
PLATE 58

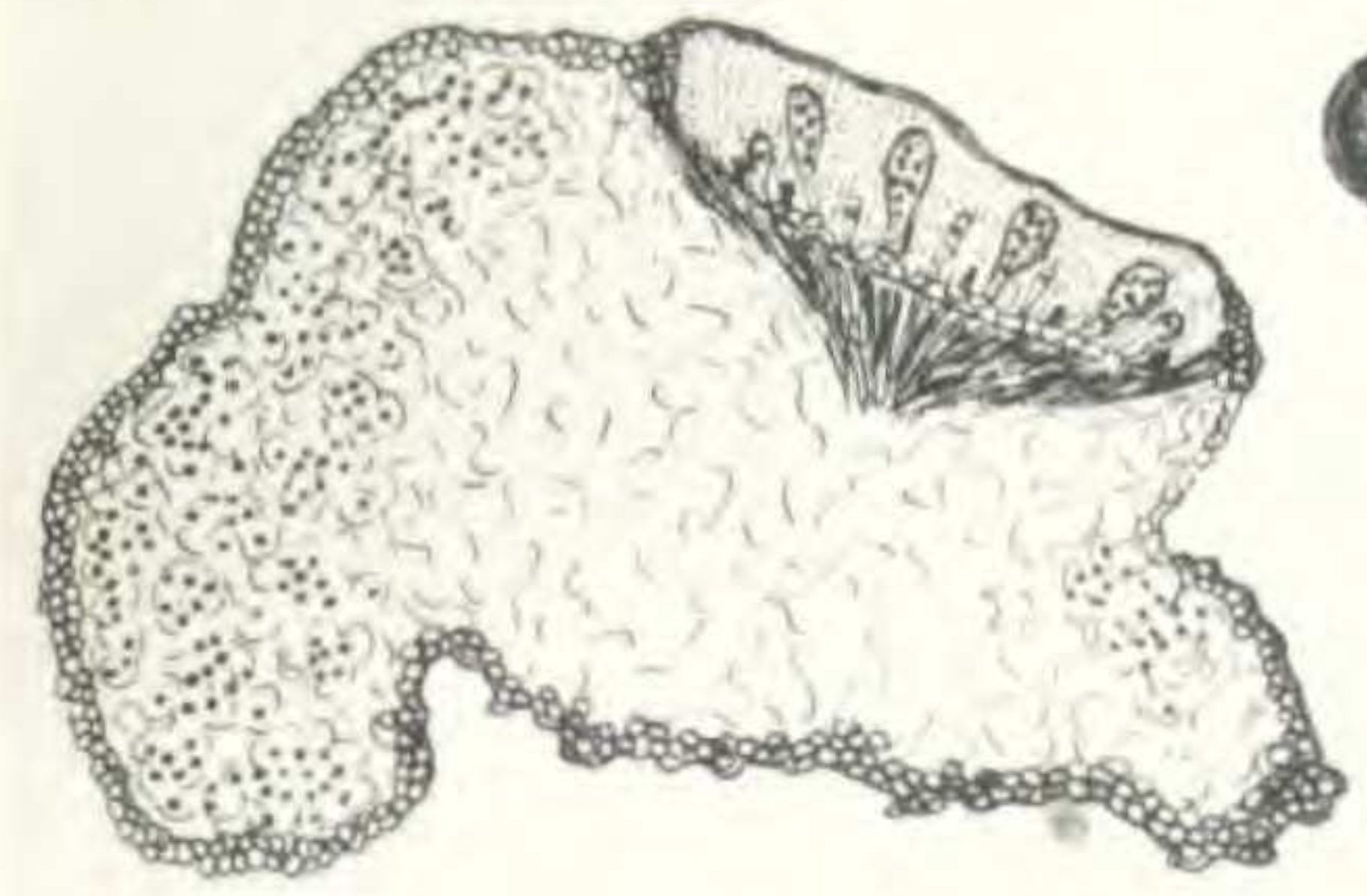
Figs. 336–339. *Buellia floccosa.*
  Fig. 336. Habit sketch. × 40.
  Fig. 337. Development of ascus through maturity. × 1100.
  Fig. 338. Paraphyses. × 1100.
  Fig. 339. Mature spores. × 1100.
Figs. 340–347. *Buellia olivaceobrunnea.*
  Fig. 340. Section through thallus and apothecium. × 104.
  Fig. 341. Habit sketch. × 25.
  Fig. 342. Mature spores. × 1865.
  Fig. 343. Paraphyses. × 1100.
  Fig. 344. Detail of medulla and cortex. × 434.
  Fig. 345. Mature spores. × 1100.
  Figs. 346–347. Development of ascus through maturity. × 1100.

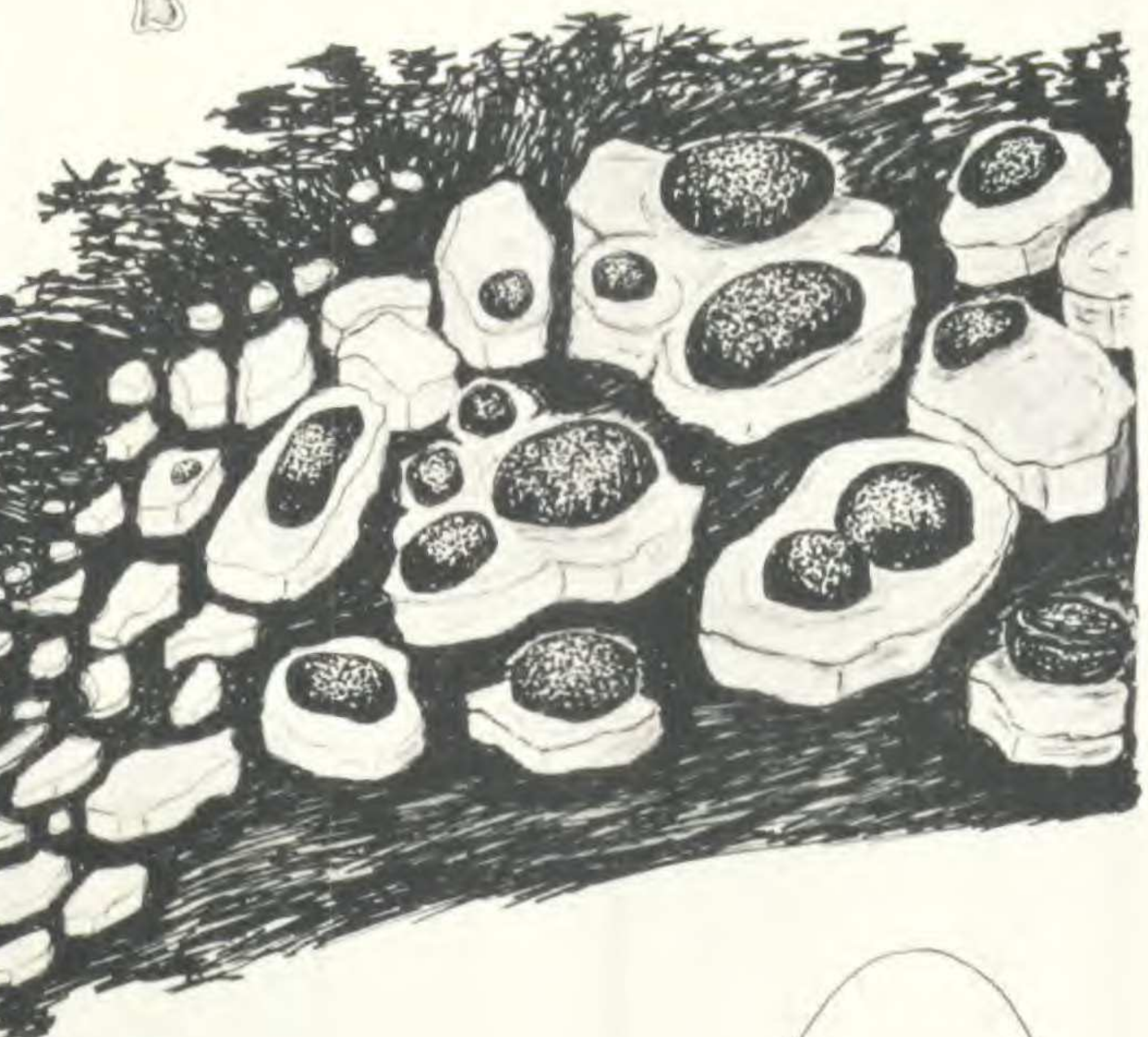

336

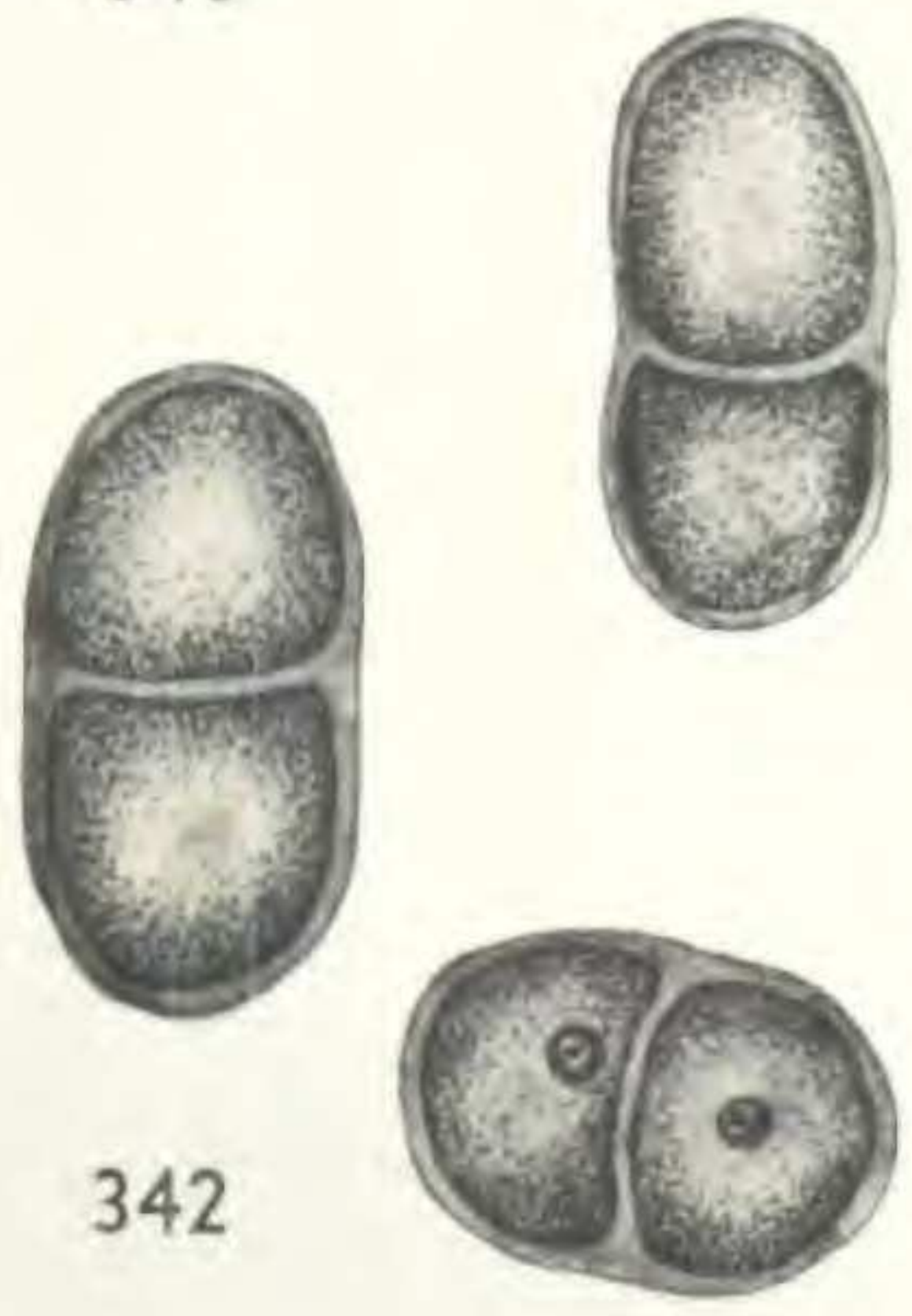

337

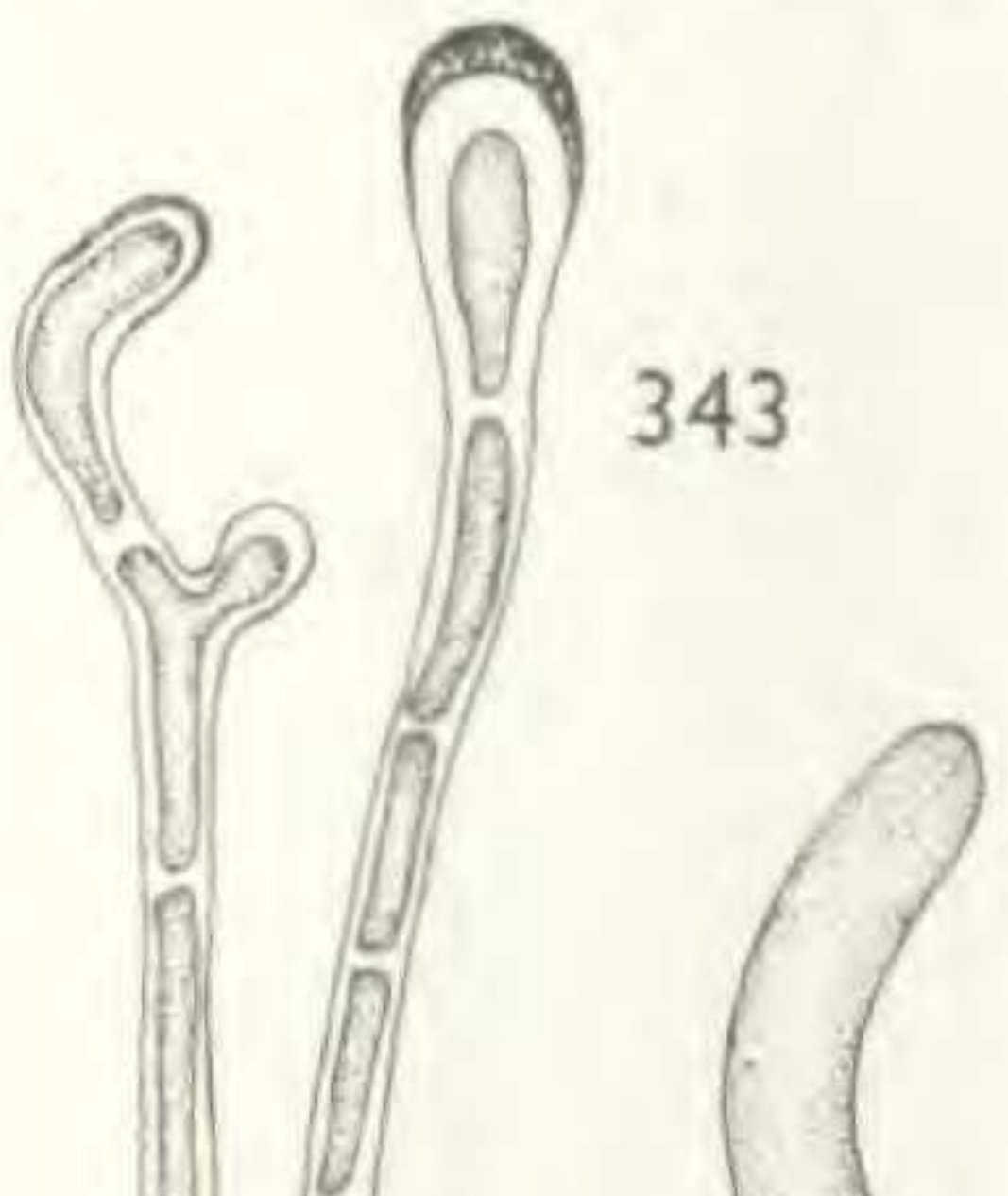

338

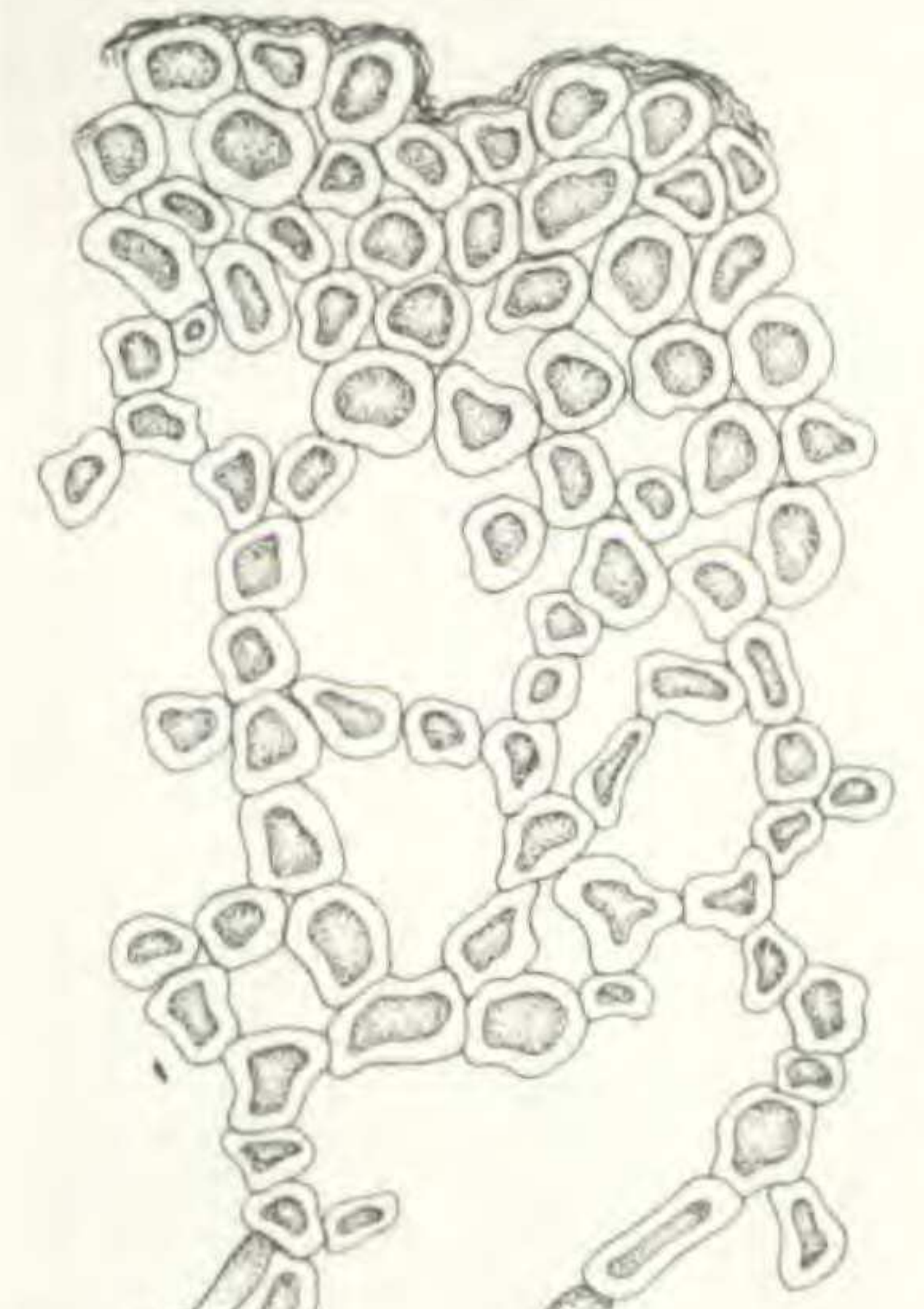

339

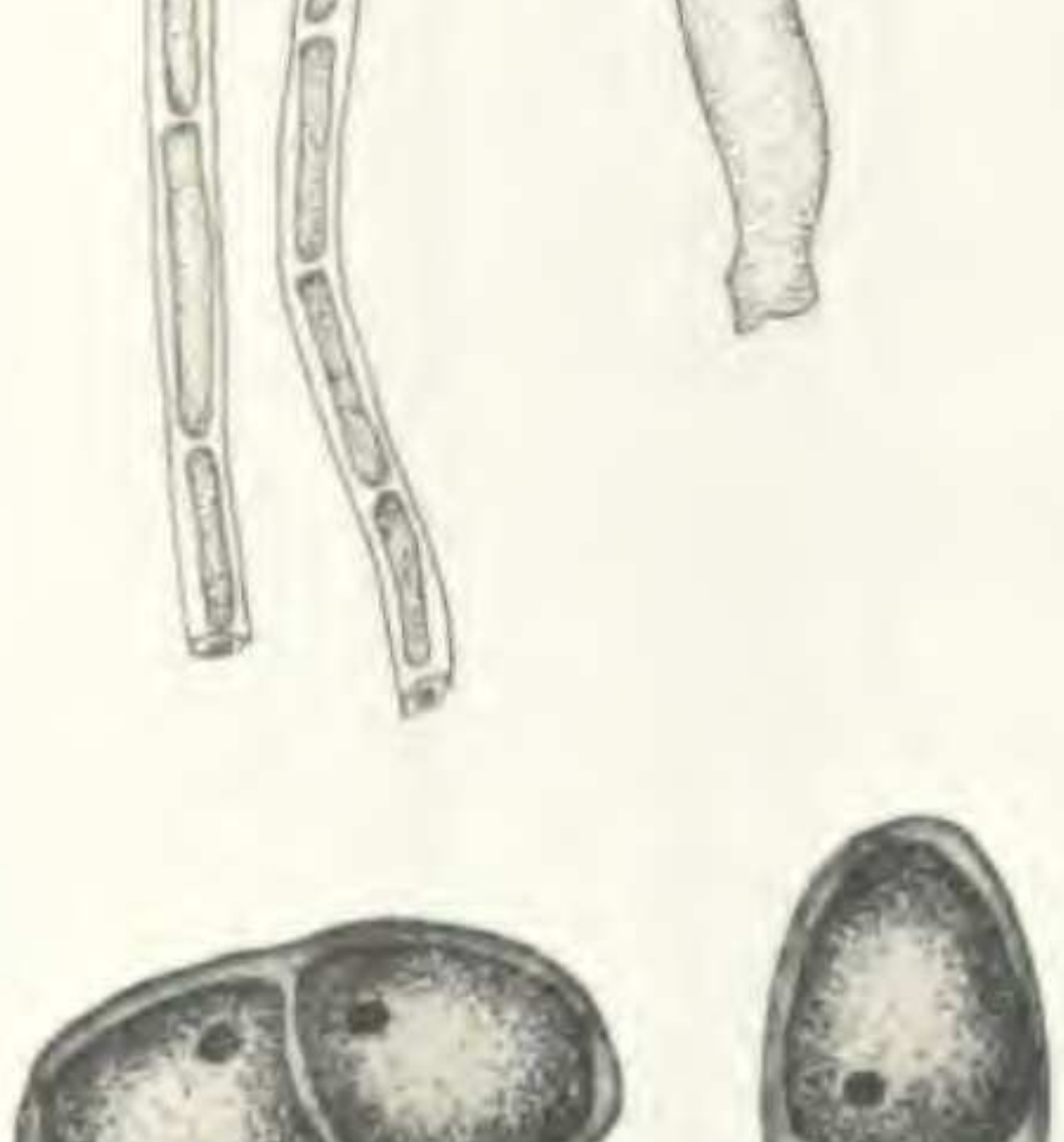

340

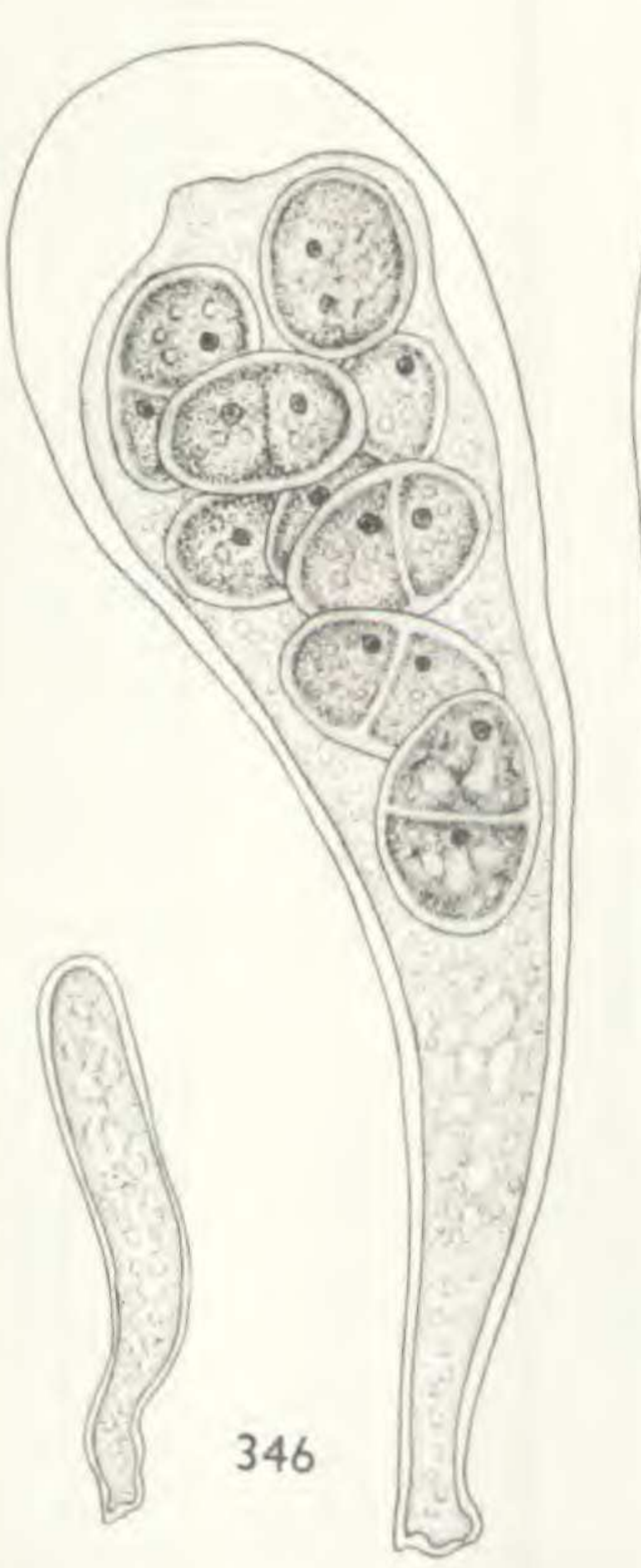

341

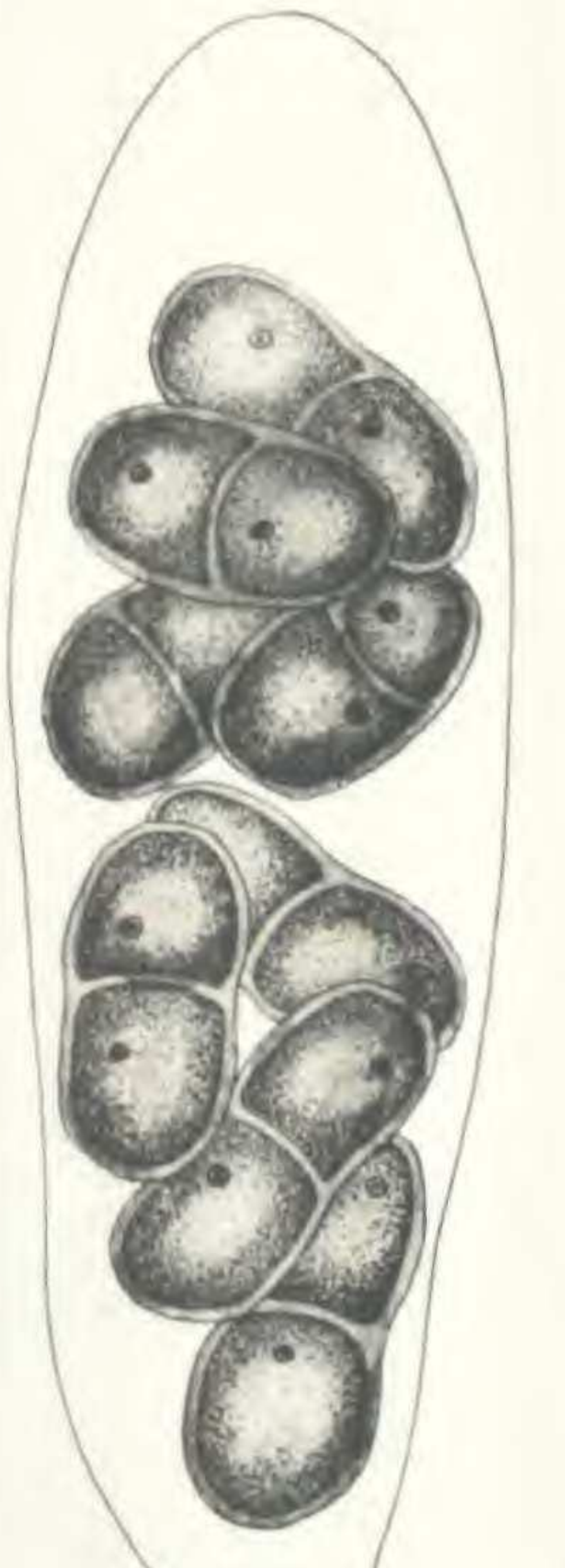

342


343


344


345


346


347

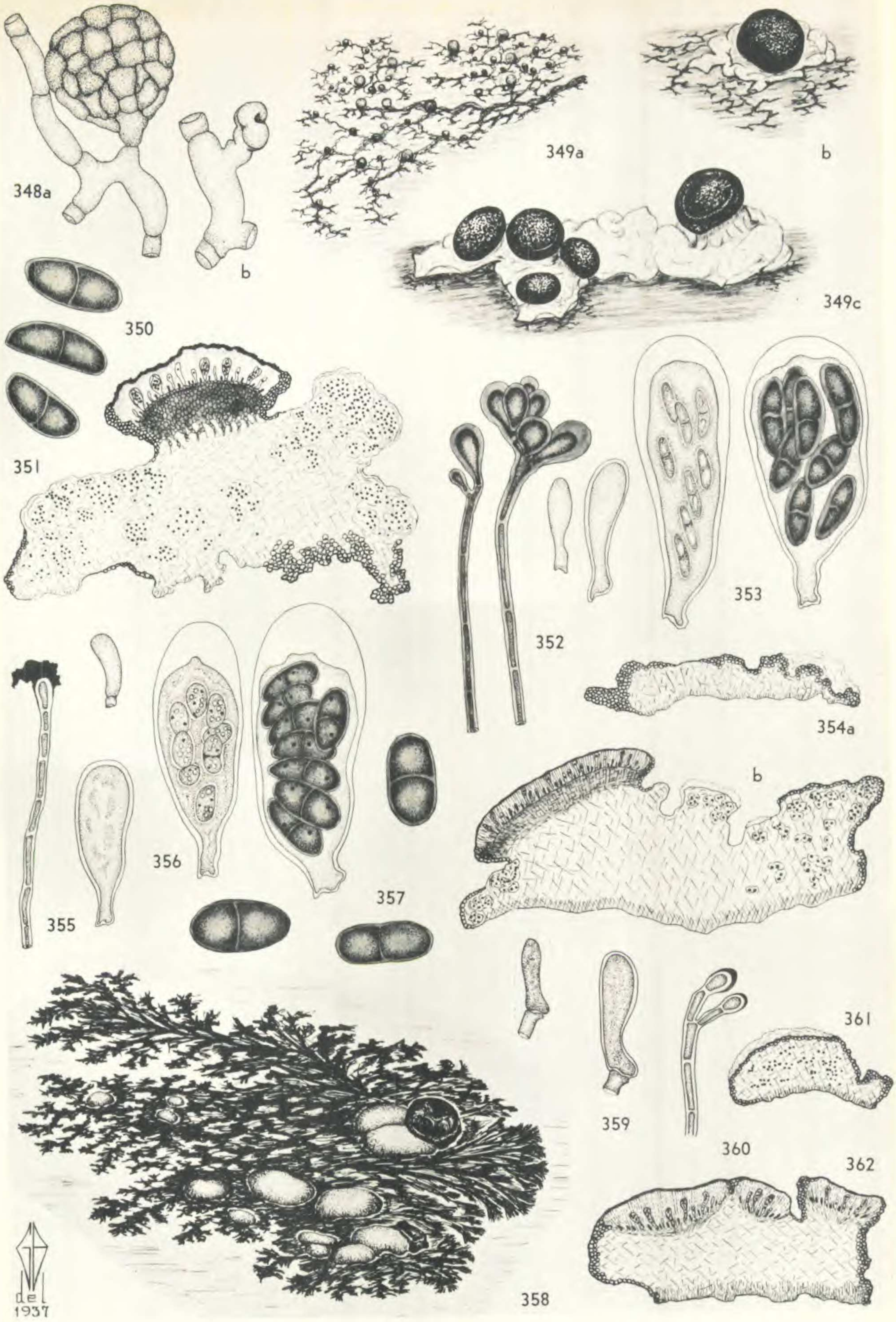
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 59

- Figs. 348–353. *Buellia muscicola.*
    - Fig. 348a. Bulbil from a young plant. × 1100.
    - Fig. 348b. Beginning of bulbil formation. × 1100.
    - Fig. 349a. Habit sketch of very young thallus. × 35.
    - Fig. 349b. Habit sketch of apothecium and thallus with non-assimilative strands still prominent. × 35.
    - Fig. 349c. Mature plant. × 35.
    - Fig. 350. Mature spores. × 1100.
    - Fig. 351. Section through apothecium and thallus. × 104.
    - Fig. 352. Paraphyses showing stages in development. × 1100.
    - Fig. 353. Development of ascus through maturity. × 1100.
- Figs. 354–357. *Buellia grisea.*
    - Fig. 354a. Section through non-assimilative thallus. × 104.
    - Fig. 354b. Section through assimilative thallus and apothecium. × 55.
    - Fig. 355. Paraphysis. × 1100.
    - Fig. 356. Development of ascus through maturity. × 1100.
    - Fig. 357. Mature spores. × 1100.
- Figs. 358–362. *Buellia dendritica.*
    - Fig. 358. Habit sketch. × 25.
    - Fig. 359. Young ascus stages. × 1100.
    - Fig. 360. Paraphysis. × 1100.
    - Fig. 361. Section through assimilative areola. × 104.
    - Fig. 362. Section through apothecia. × 104.


348a
b
349a
b
349c
350
351
352
353
354a
b
355
356
357
358
359
360
361
362
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

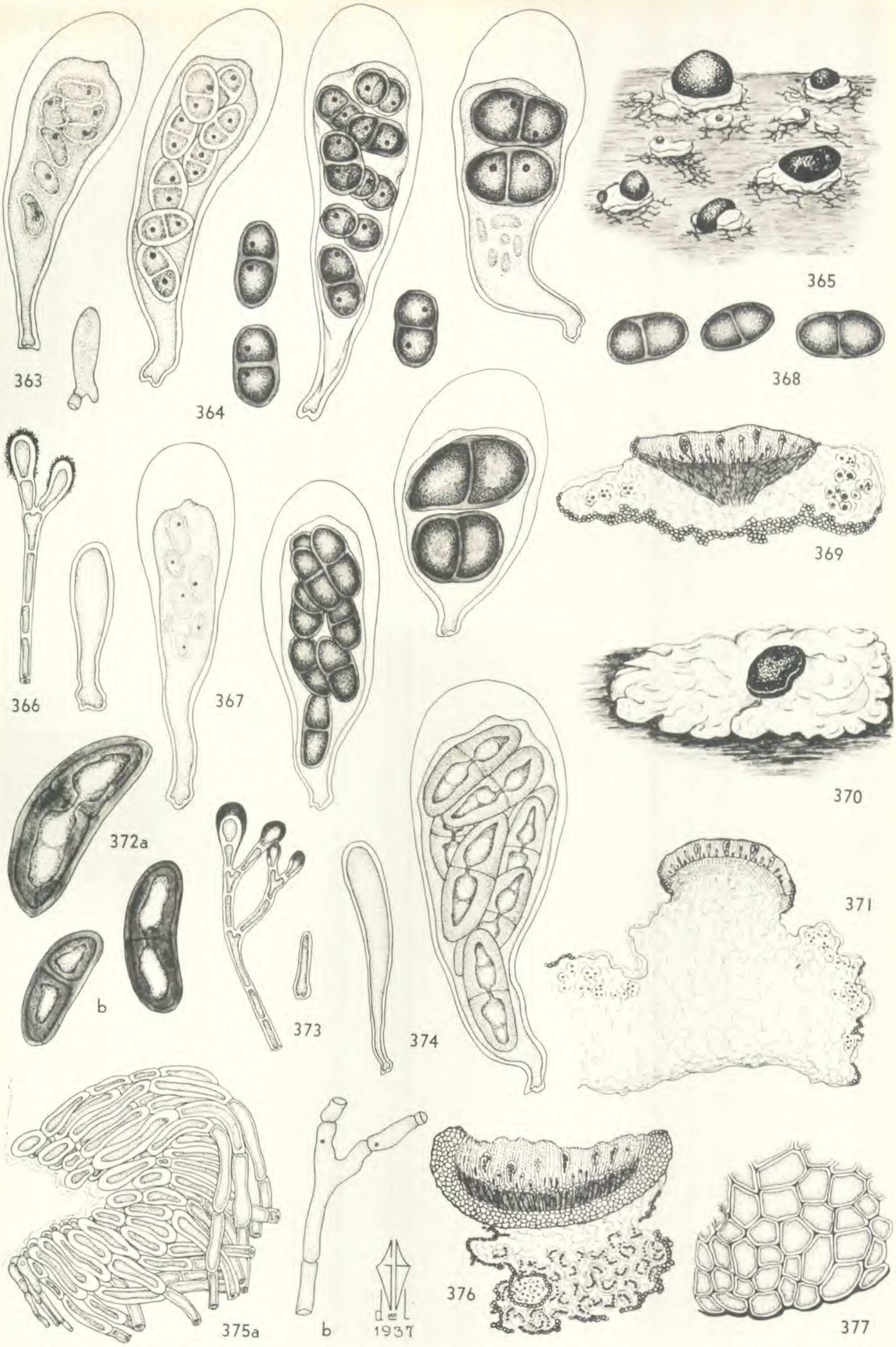
PLATE 60

Figs. 363–364. *Buellia dendritica.*
- Fig. 363. Development of ascus through maturity, including an abnormal 2-spored ascus with vestiges of the other spores. × 1100.
- Fig. 364. Mature spores. × 1100.

Figs. 365–369. *Buellia albida.*
- Fig. 365. Habit sketch. × 35.
- Fig. 366. Paraphysis. × 1100.
- Fig. 367. Development of ascus through maturity, including an abnormal 2-spored ascus. × 1100.
- Fig. 368. Mature spores. × 1100.
- Fig. 369. Section through thallus and apothecium. × 177.

Figs. 370–375. *Buellia Russellii.*
- Fig. 370. Habit sketch. × 35.
- Fig. 371. Section through thallus and apothecium. × 104.
- Fig. 372a. Developing spore with canal still present between the two cells. × 1865.
- Fig. 372b. Spores showing successive development. × 1100.
- Fig. 373. Paraphysis. × 1100.
- Fig. 374. Development of ascus through maturity. × 1100.
- Fig. 375a. Cells from thallus margin and adjoining epithecium. × 1100.
- Fig. 375b. Medullar hyphae. × 1100.

Figs. 376–377. *Buellia (Diplotomma) Siplei.*
- Fig. 376. Section through thallus and basal algae. × 104.
- Fig. 377. Detail of basal parathecium. × 1100.

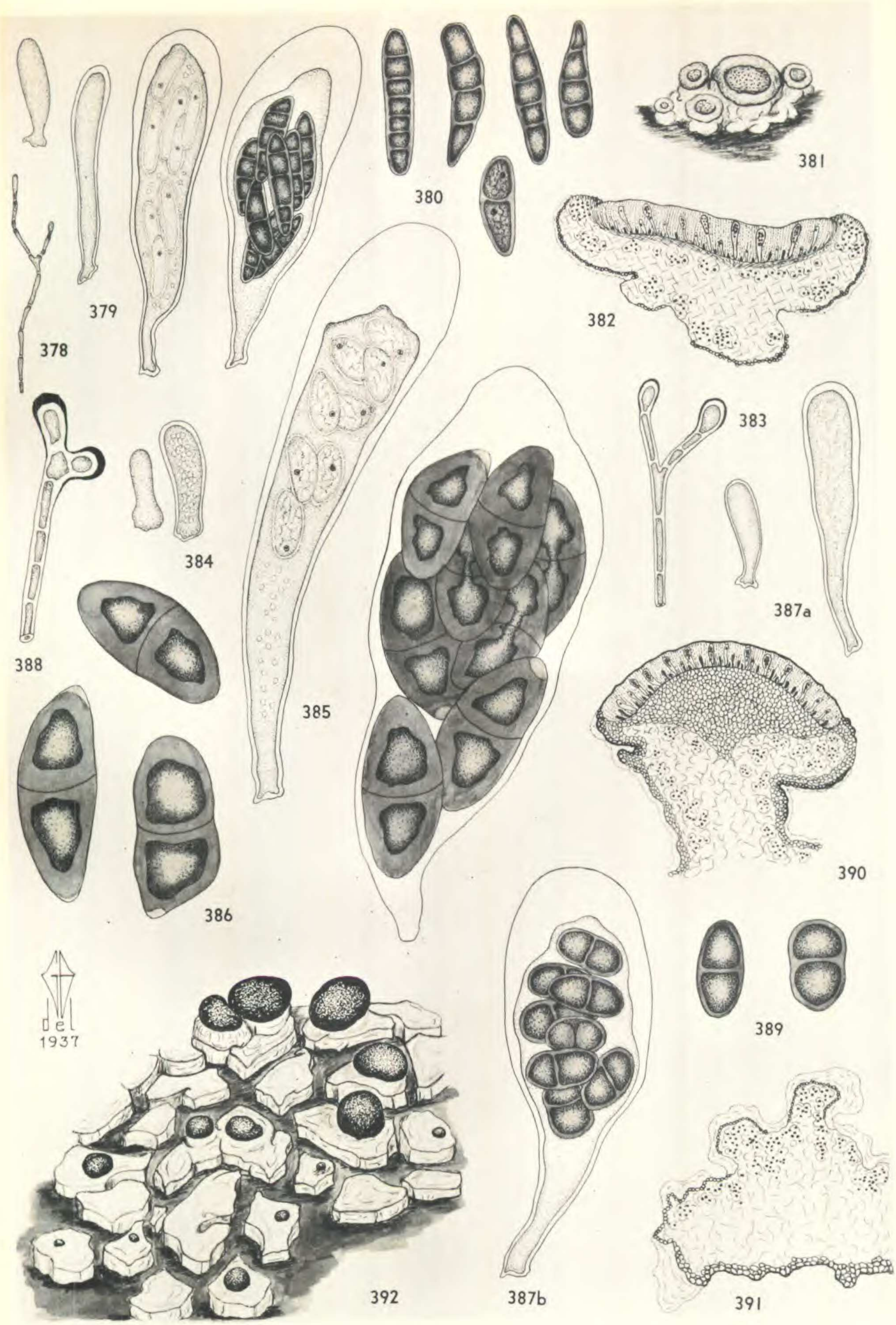

363
364
365
368
366
367
369
370
372a
b
373
374
371
375a
b
del
1937
376
377

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 61

Figs. 378–380. *Buellia (Diplotomma) Siplei.*
  Fig. 378. Paraphysis. × 1100.
  Fig. 379. Development of ascus. × 1100.
  Fig. 380. Spores in varying degrees of maturity. × 1100.
Figs. 381–386. *Rinodina olivaceobrunnea.*
  Fig. 381. Habit sketch. × 50.
  Fig. 382. Section through apothecium. × 55.
  Fig. 383. Paraphysis. × 1100.
  Fig. 384. Young asci. × 1100.
  Fig. 385. Older and mature asci. × 1100.
  Fig. 386. Mature spores. × 1100.
Figs. 387–392. *Rinodina sordida.*
  Figs. 387a and b. Development of ascus. × 1100.
  Fig. 388. Paraphysis. × 1100.
  Fig. 389. Mature spores. × 1100.
  Fig. 390. Section through apothecium. × 55.
  Fig. 391. Section through thallus. × 55.
  Fig. 392. Habit sketch. × 20.



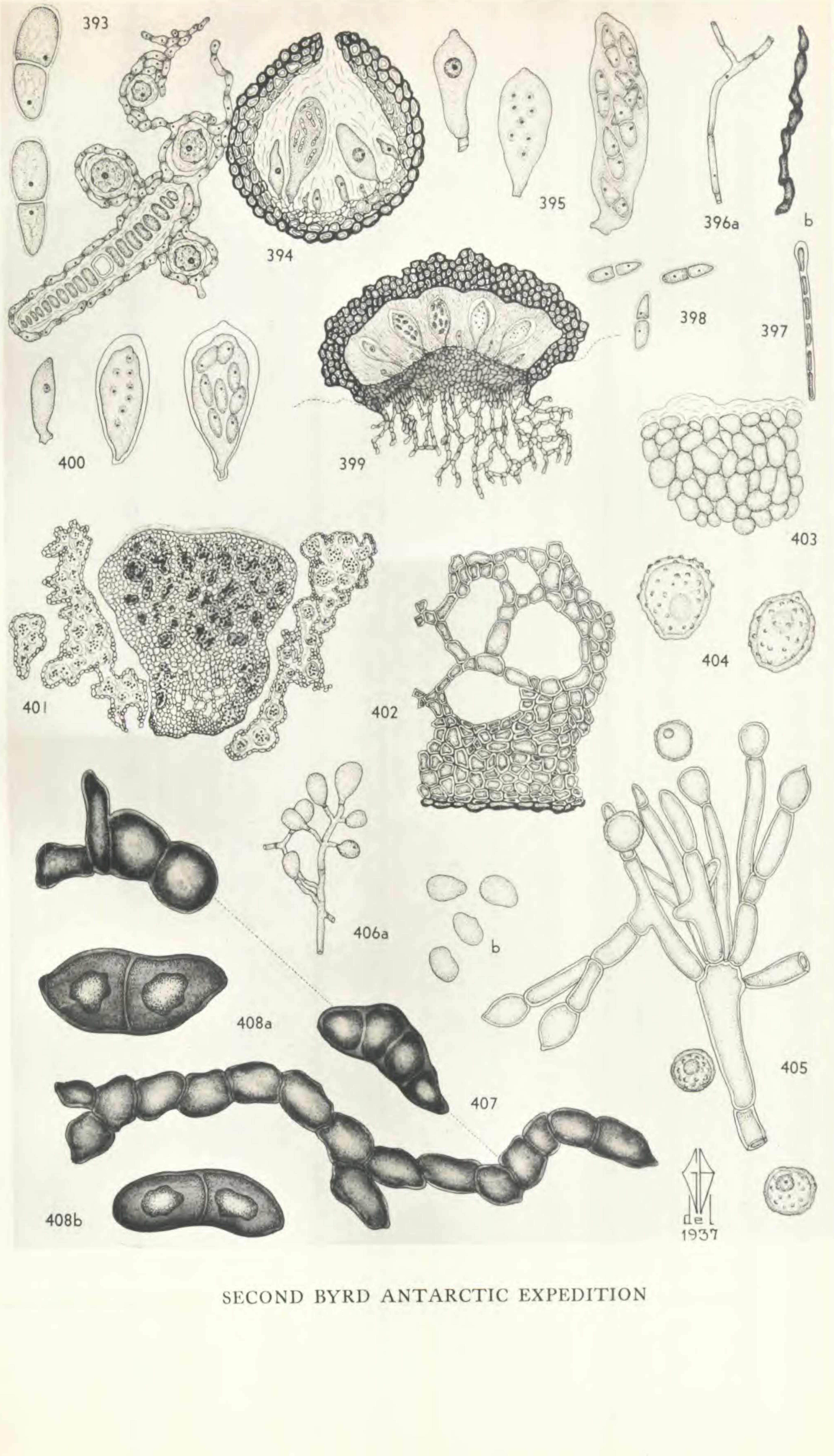
378
379
380
381
382
383
384
385
386
387a
387b
388
389
390
391
392
del
1937

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 62

Figs. 393–395. *Thelidium parvum.*
  Fig. 393. Mature spores. × 1865.
  Fig. 394. Perithecium and associated algae. × 434.
  Fig. 395. Development of ascus. × 1100.
Figs. 396–400. *Diplonaevia Parmeliae.*
  Fig. 396a. Detail of hyphae of host, *Parmelia.* × 1100.
  Fig. 396b. Detail of hyphae of parasite. × 1100.
  Fig. 397. Paraphysis. × 1100.
  Fig. 398. Mature spores. × 1100.
  Fig. 399. Section of apothecium, the host surface indicated by dotted lines. × 385.
  Fig. 400. Development of ascus. × 1100.
Figs. 401–403. *Pyrenodesmia Darbishirei.*
  Fig. 401. Section through thallus. × 55.
  Fig. 402. Detail of basal cortex. × 735.
  Fig. 403. Detail of upper cortex. × 735.
Figs. 404–406. *Scopulariopsis brevicaulis.*
  Fig. 404. Conidia. × 1865.
  Fig. 405. Conidiophores and conidia. × 1100.
  Figs. 406a and b. *Botrytis* sp. Conidiophores and conidia. × 1865.
Fig. 407. *Hormiscium* sp. Hyphae. × 1100.
Fig. 408. *Rinodina* sp. Mature spores. × 1100; found in preparation of *Blastenia succinea* growing over *Umbilicaria cerebriformis* from Skua Gull Peak, *P. Siple & S. Corey 72W-15.* It is possible that some apothecium of *Rinodina* among those of *Blastenia* has been overlooked, as the material is scant and the apothecia are very small.


393
394
395
396a
b
398
397
400
399
403
401
402
404
406a
b
405
408a
407
408b
de l
1937

SECOND BYRD ANTARCTIC EXPEDITION

EXPLANATION OF PLATE

PLATE 63

All photographs were made by Mr. Verne Goerger.

Fig. 409. *Lecidea cancriformis.* Apothecia and thalli from Queen Maud Mts.

Fig. 410. *Lecidea Siplei.* Section through apothecium.

Fig. 411. *Pyrenodesmia Darbishirei.* Section through thallus.

Fig. 412. *Umbilicaria cerebriformis.* Skua Gull Peak, Marie Byrd Land. Thallus.

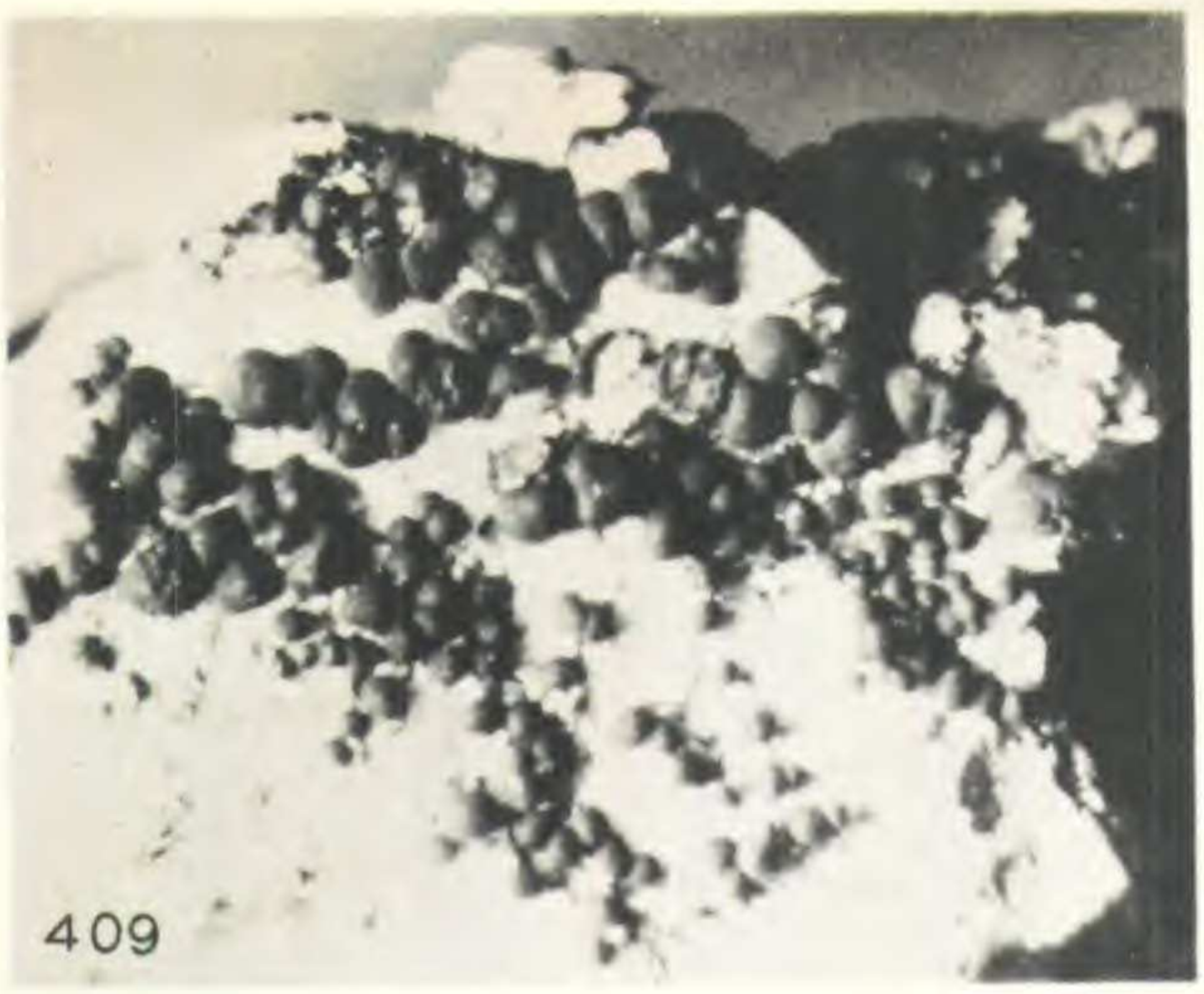
Fig. 413. *Lecanora Siplei.* Apothecia.

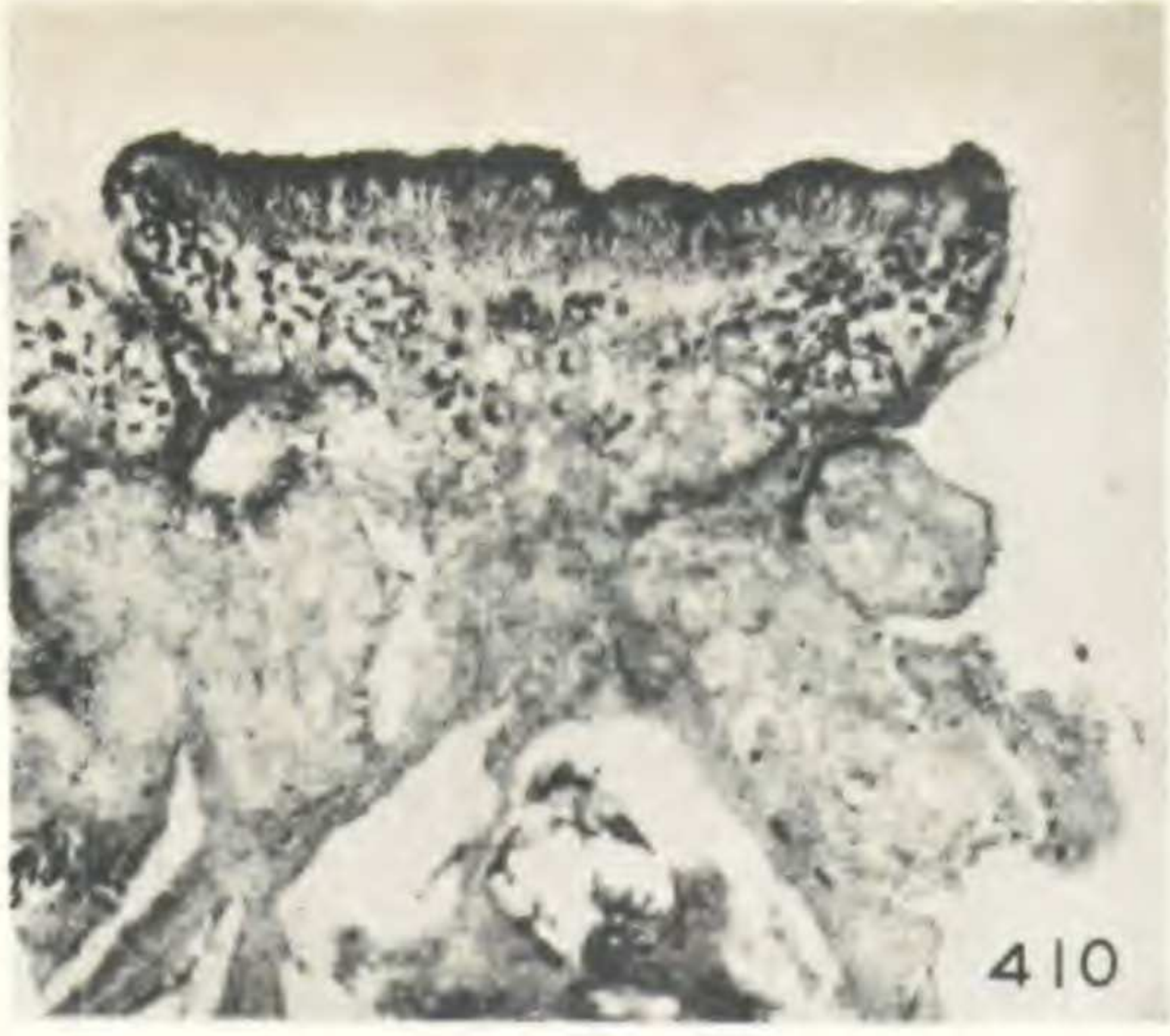
Fig. 414. *Umbilicaria rugosa.* Thallus.

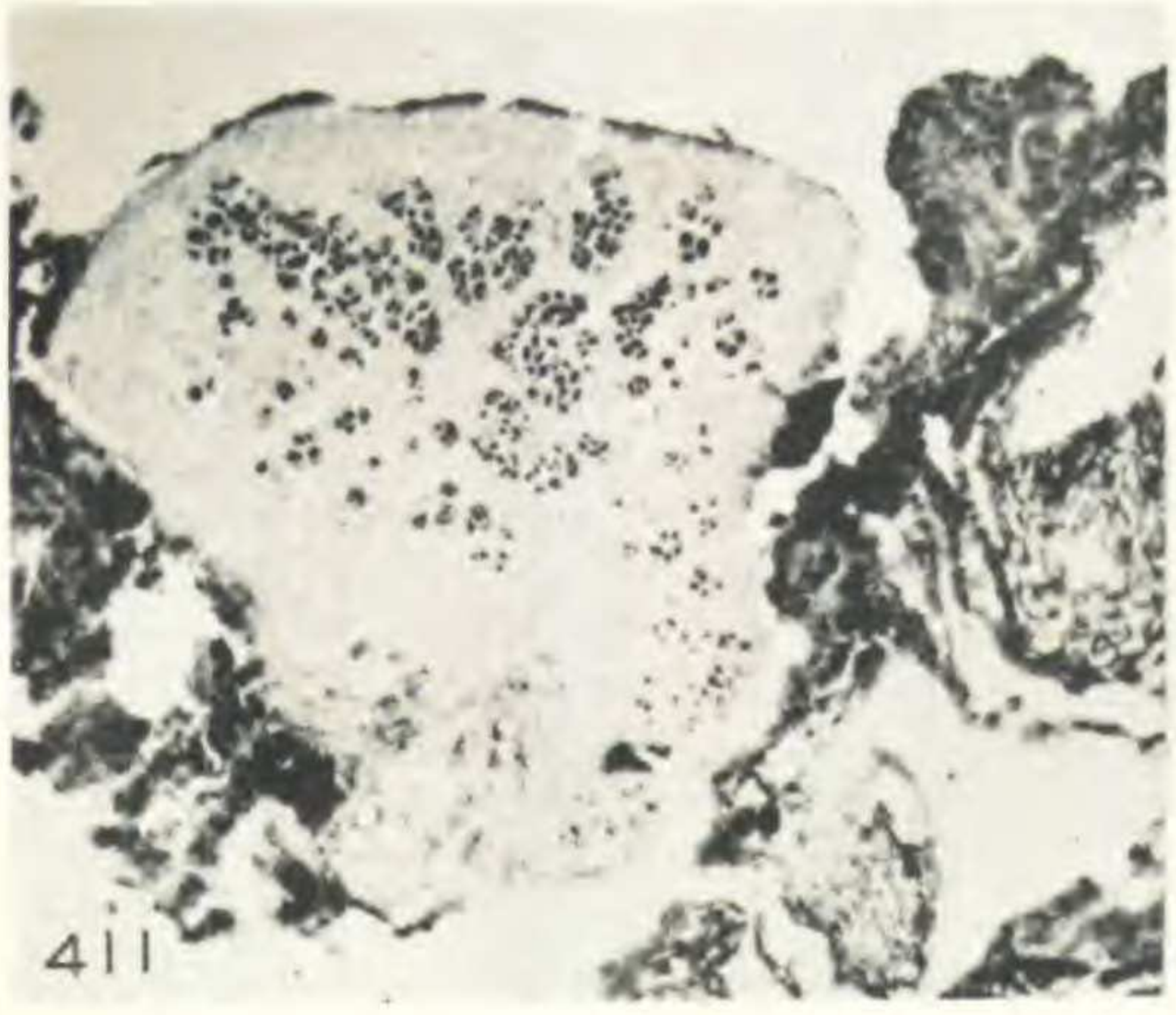
Fig. 415. *Lecanora Siplei.* Apothecia.

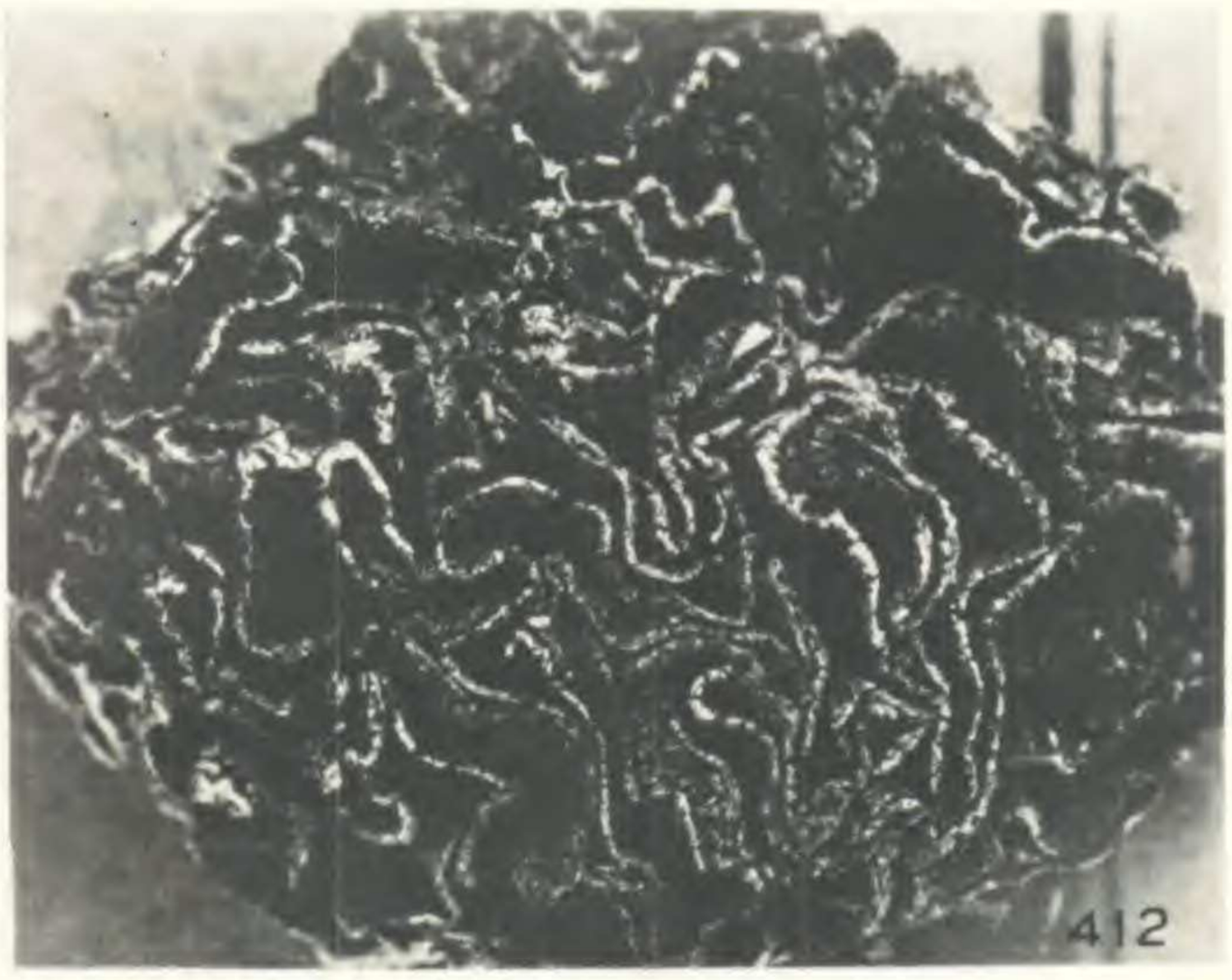
Fig. 416. *Umbilicaria rugosa.* Thallus, natural size.

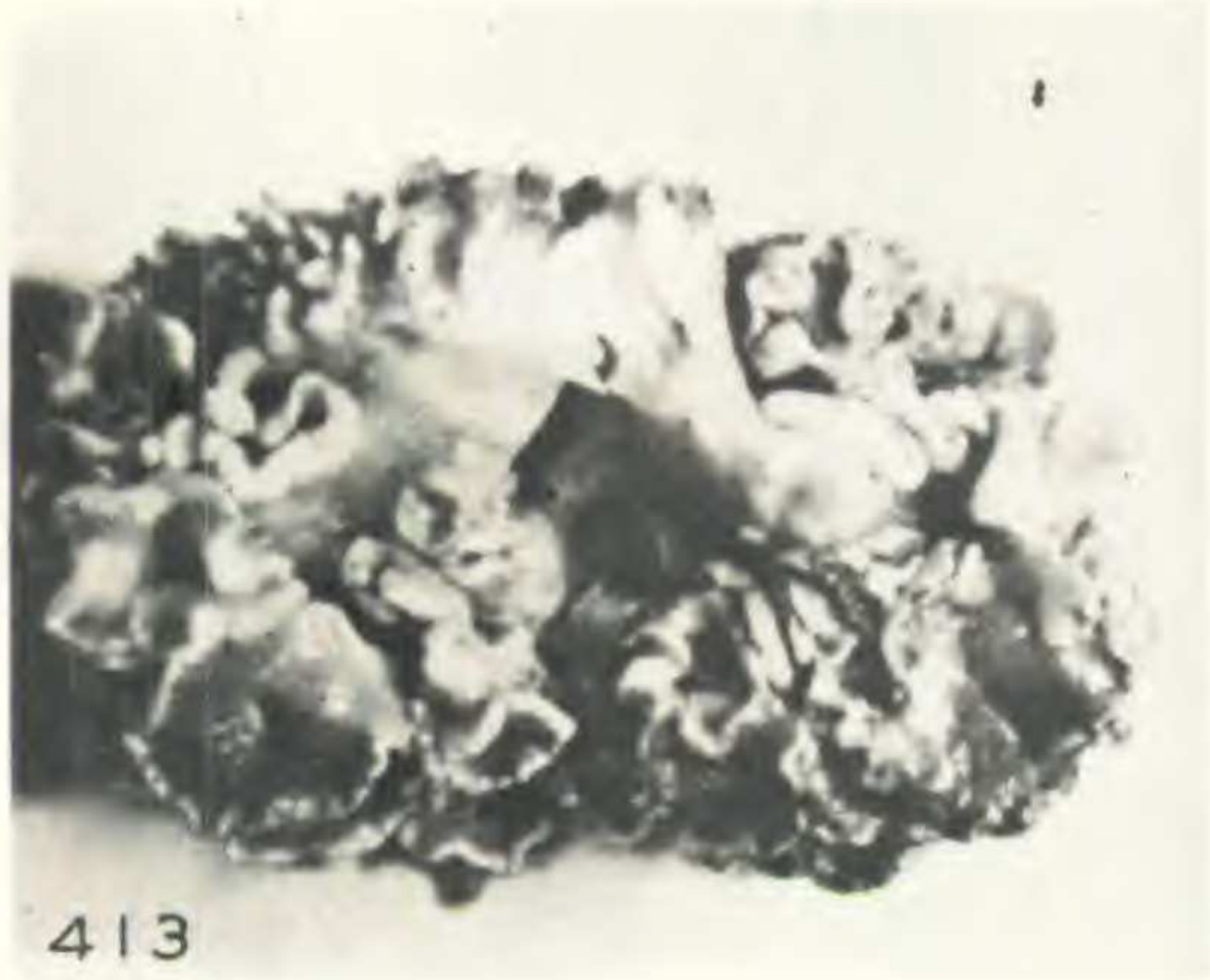
Fig. 417. *Pannoparmelia pellucida* and *P. delicata.* Thallus, natural size.

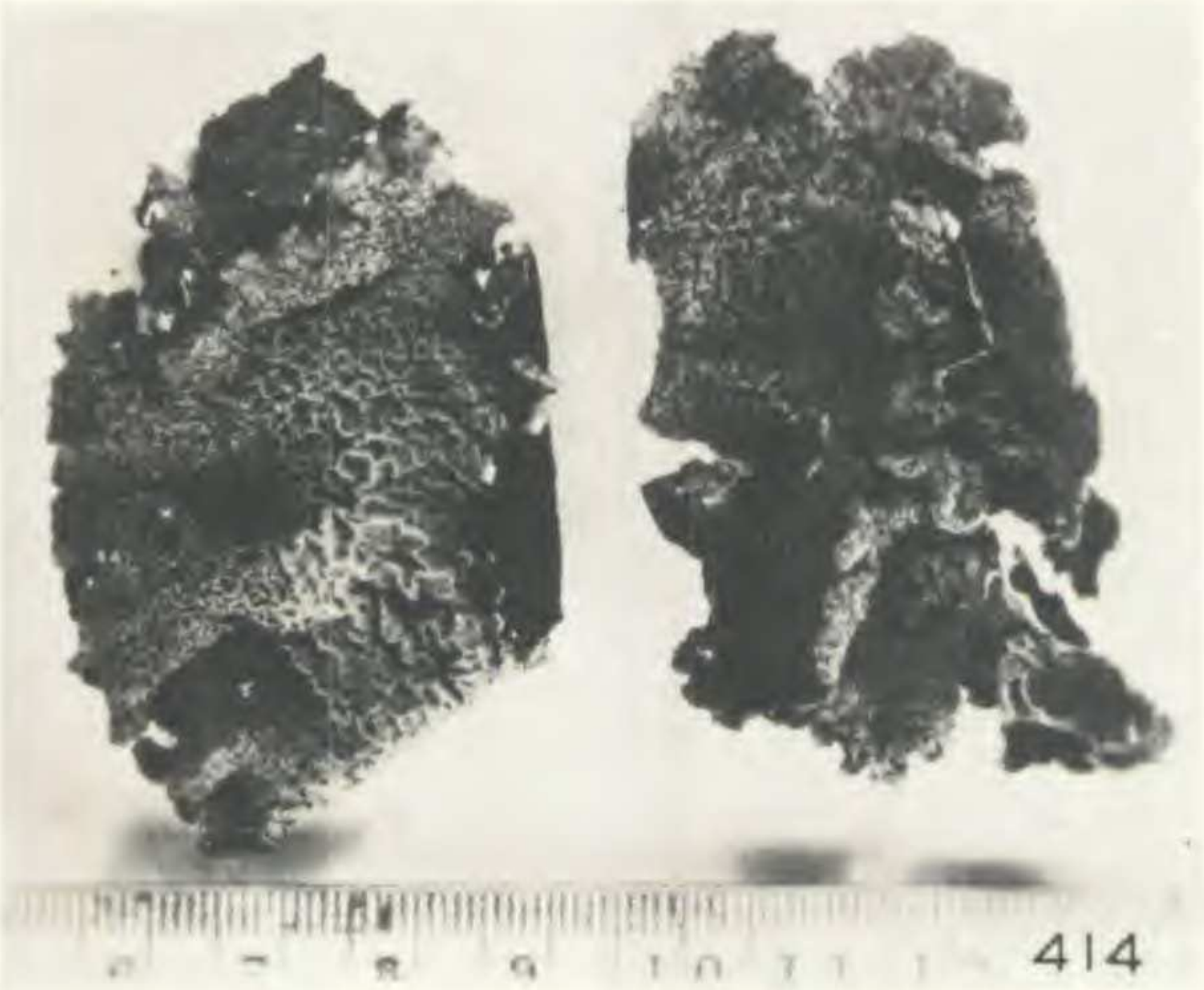

409

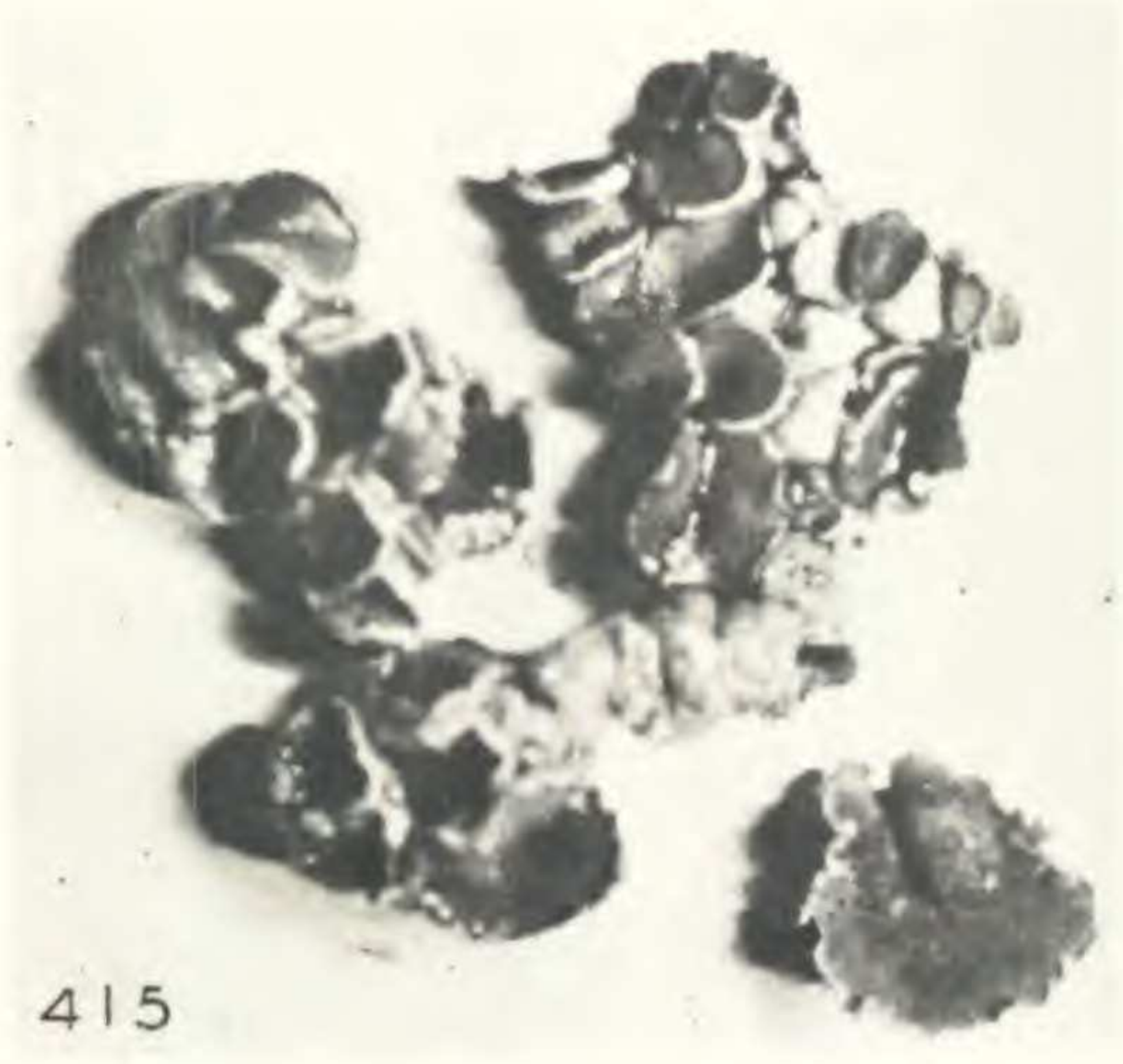

410

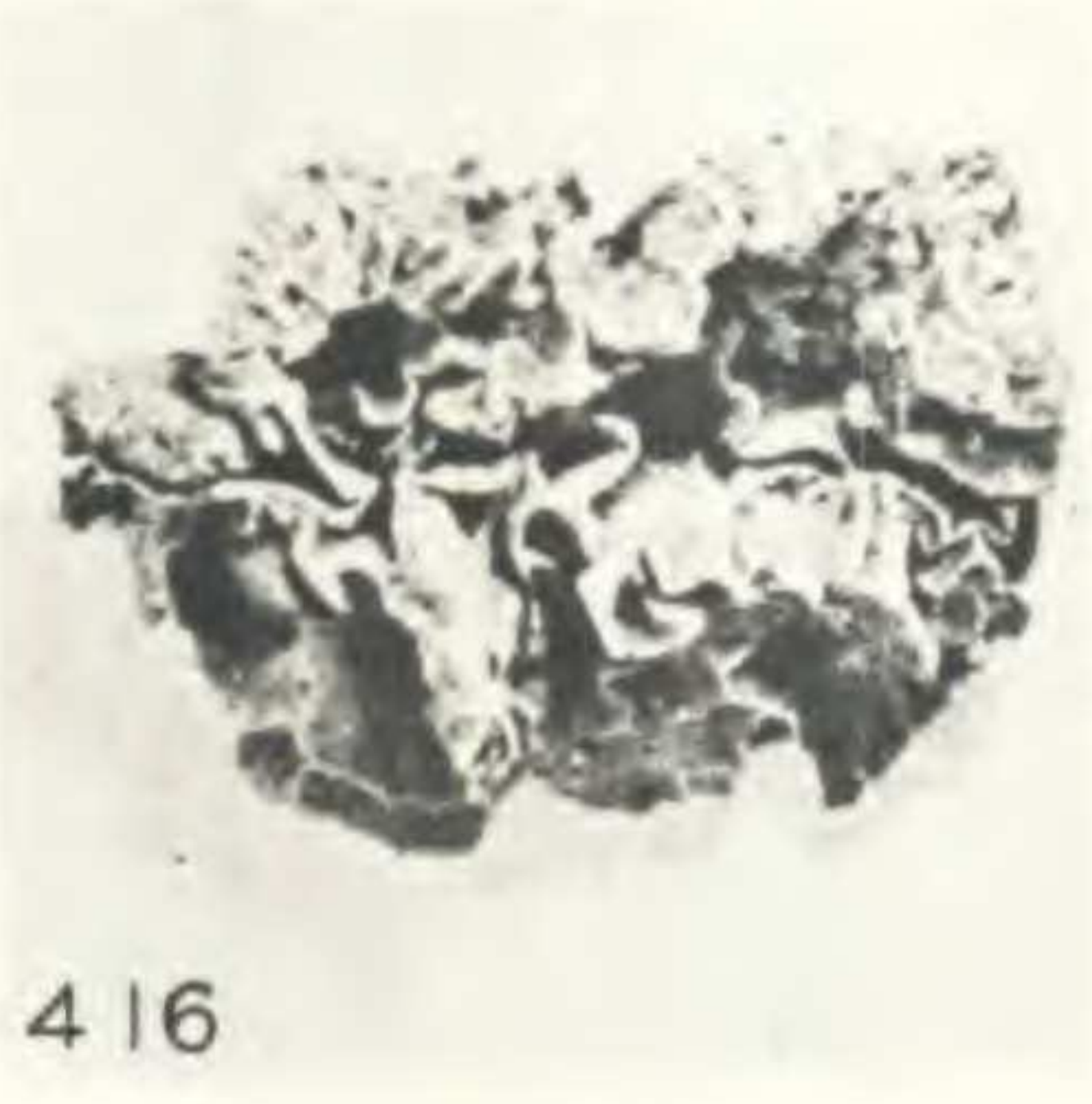

411

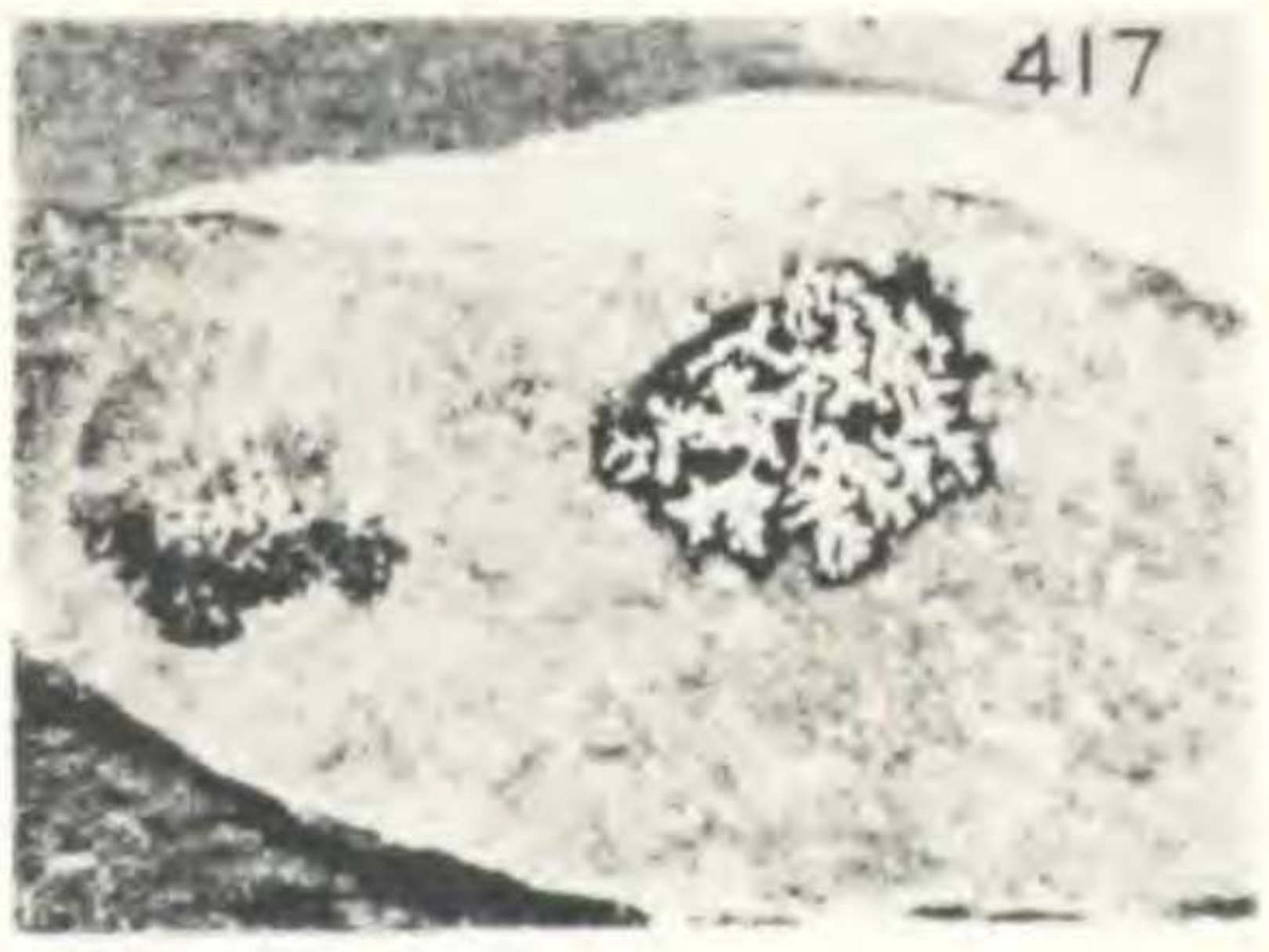

412


413


414


415


416


417

SECOND BYRD ANTARCTIC EXPEDITION

Explanation of Plate

PLATE 64

Fig. 418. *Pannoparmelia pellucida*, showing extensive hypothallus. × 8.

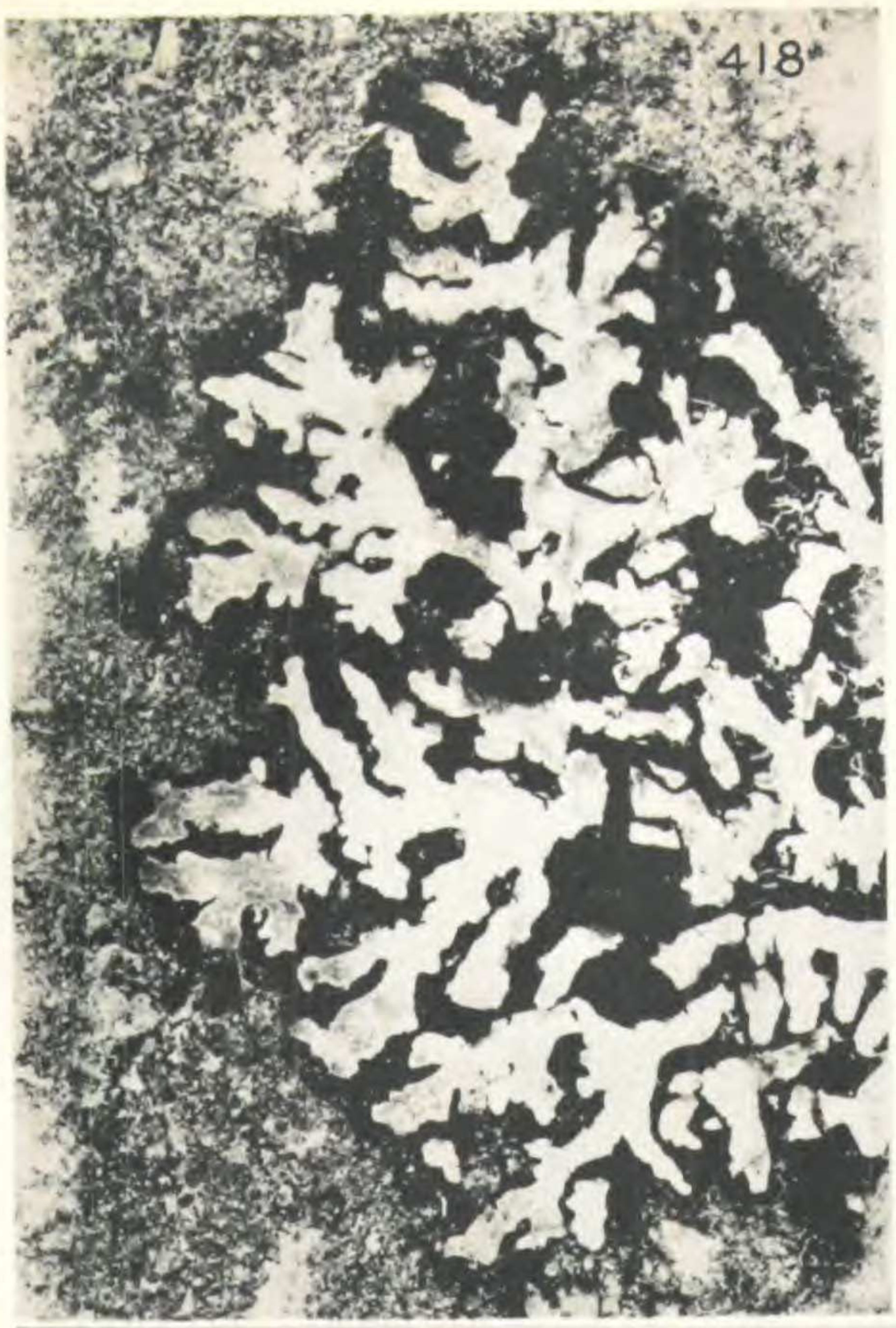
Fig. 419. *Pannoparmelia delicata*, section showing apothecium and lobe of thallus. × 115.

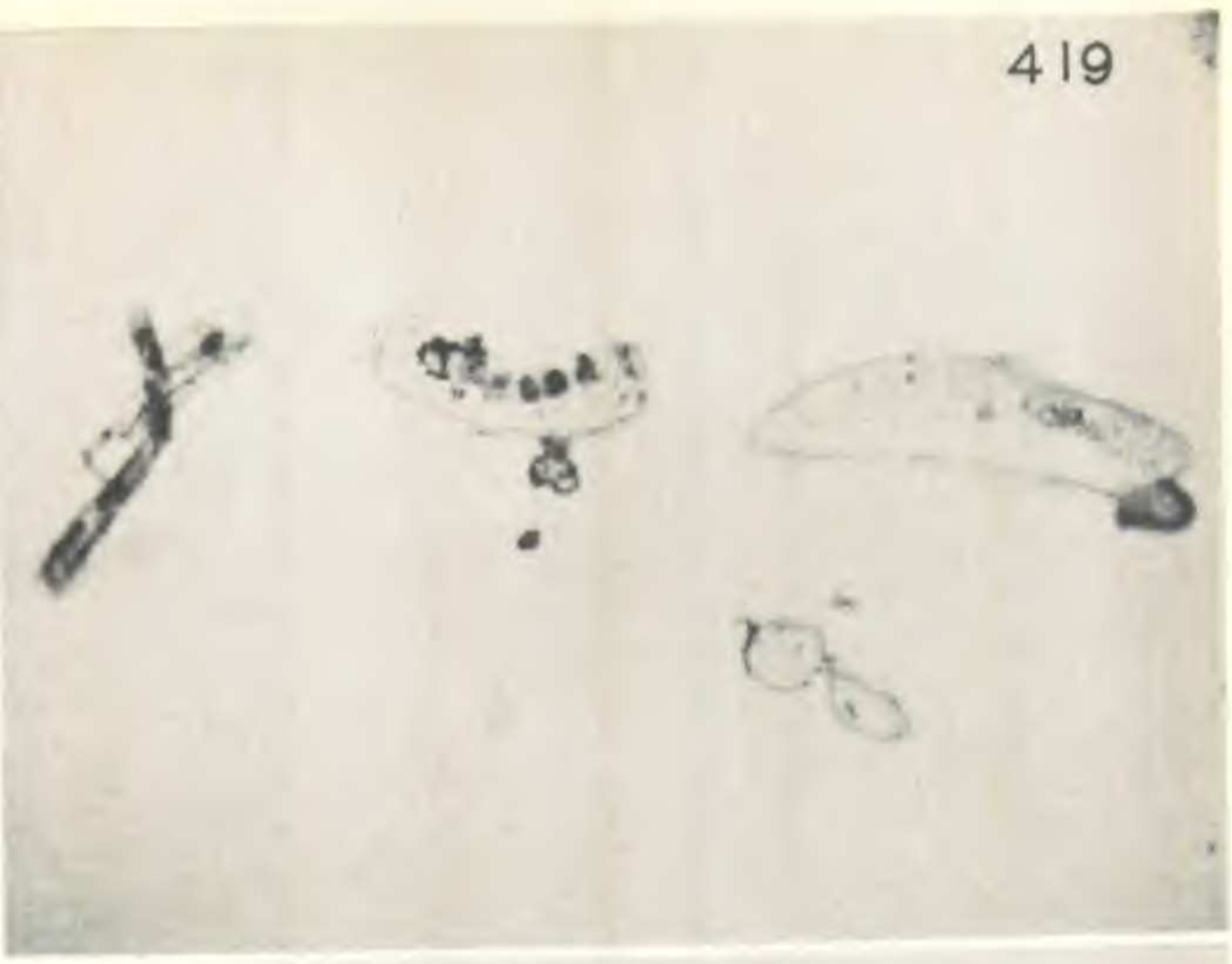
Fig. 420. *Pannoparmelia delicata*, section of apothecium, showing trace of hymenium, which is mostly replaced by soredia. Note large thick-walled dark cells at the right which may be a bit of cortex, or may belong to a parasite. × 500.

Fig. 421. *Pannoparmelia pellucida*, section through two lobes of thallus, showing a portion of a branching rhizina. × 800.

Fig. 422. *Pannoparmelia pellucida*. Details of thalline structure. × 2500.

Fig. 423. *Pannoparmelia delicata*. Thallus × 8.


418


419

420

421

422

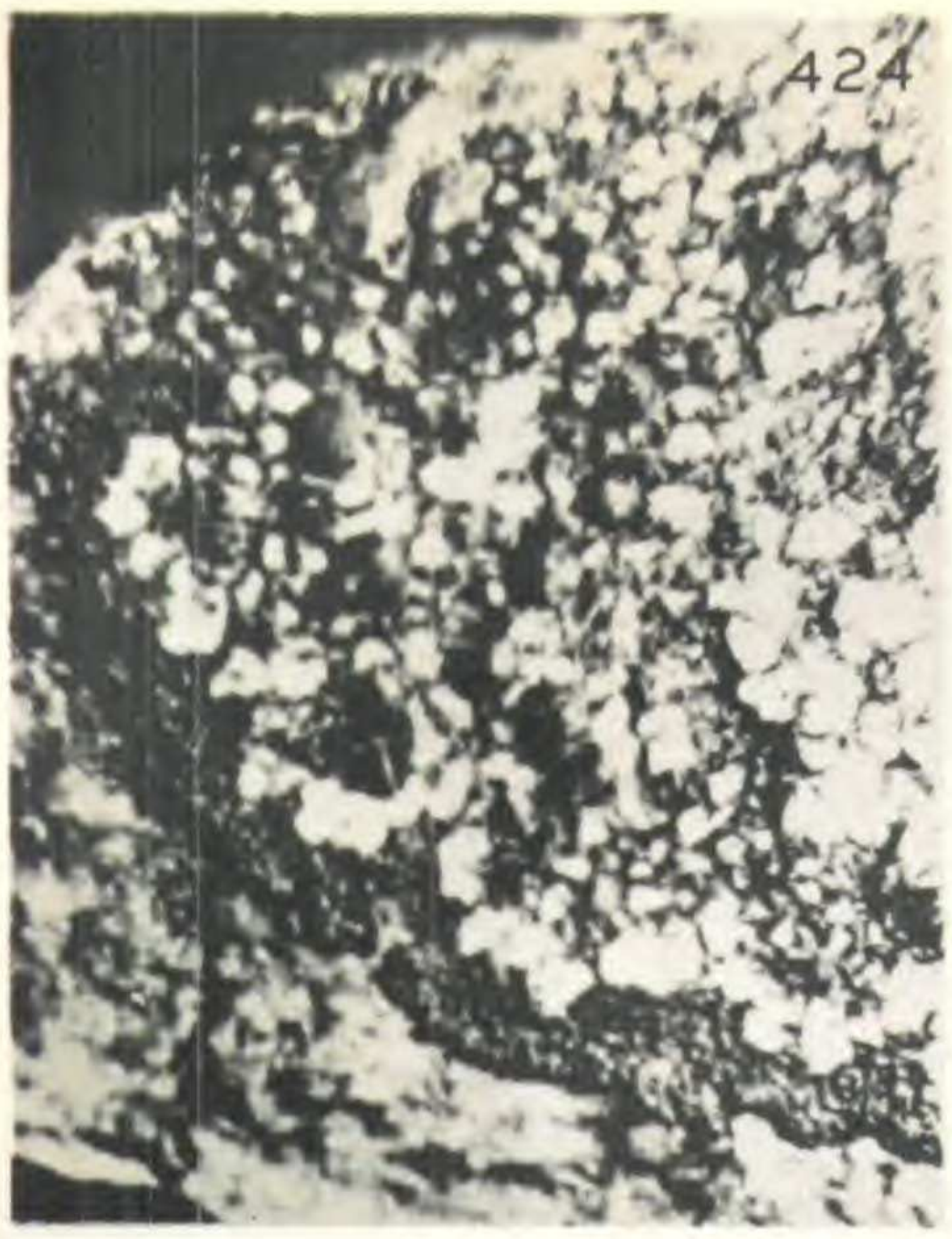
423

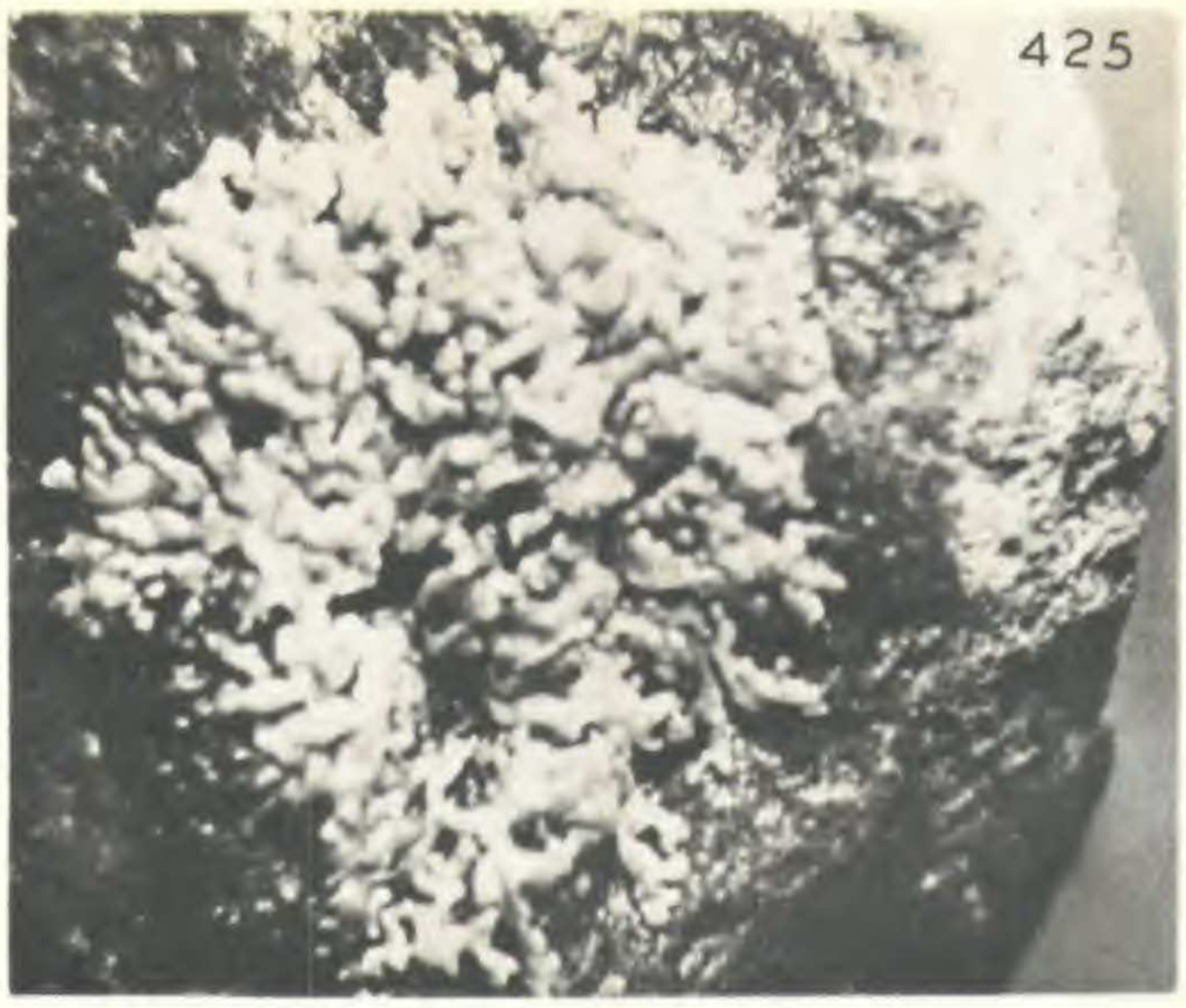
SECOND BYRD ANTARCTIC EXPEDITION

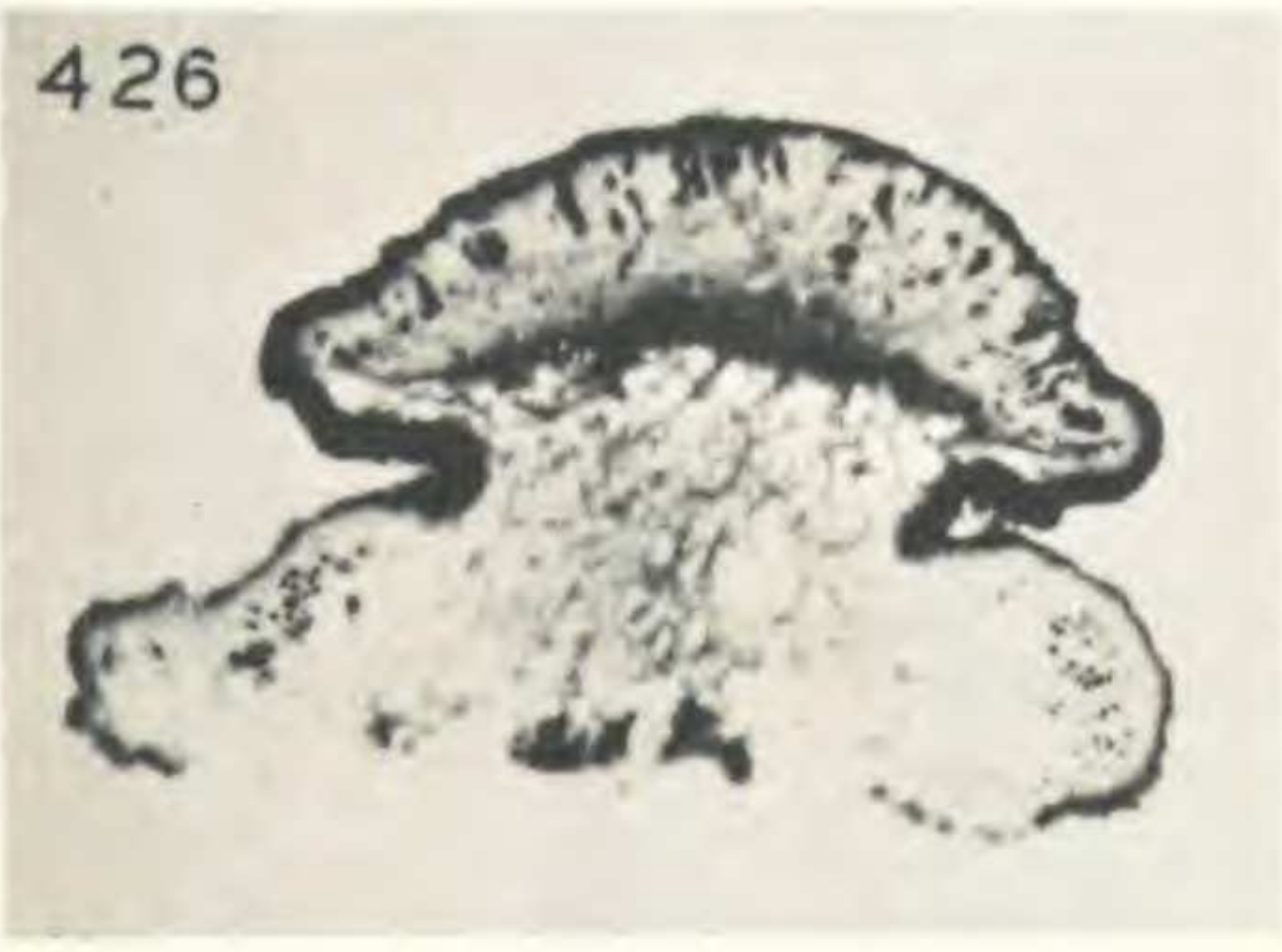
Explanation of Plate

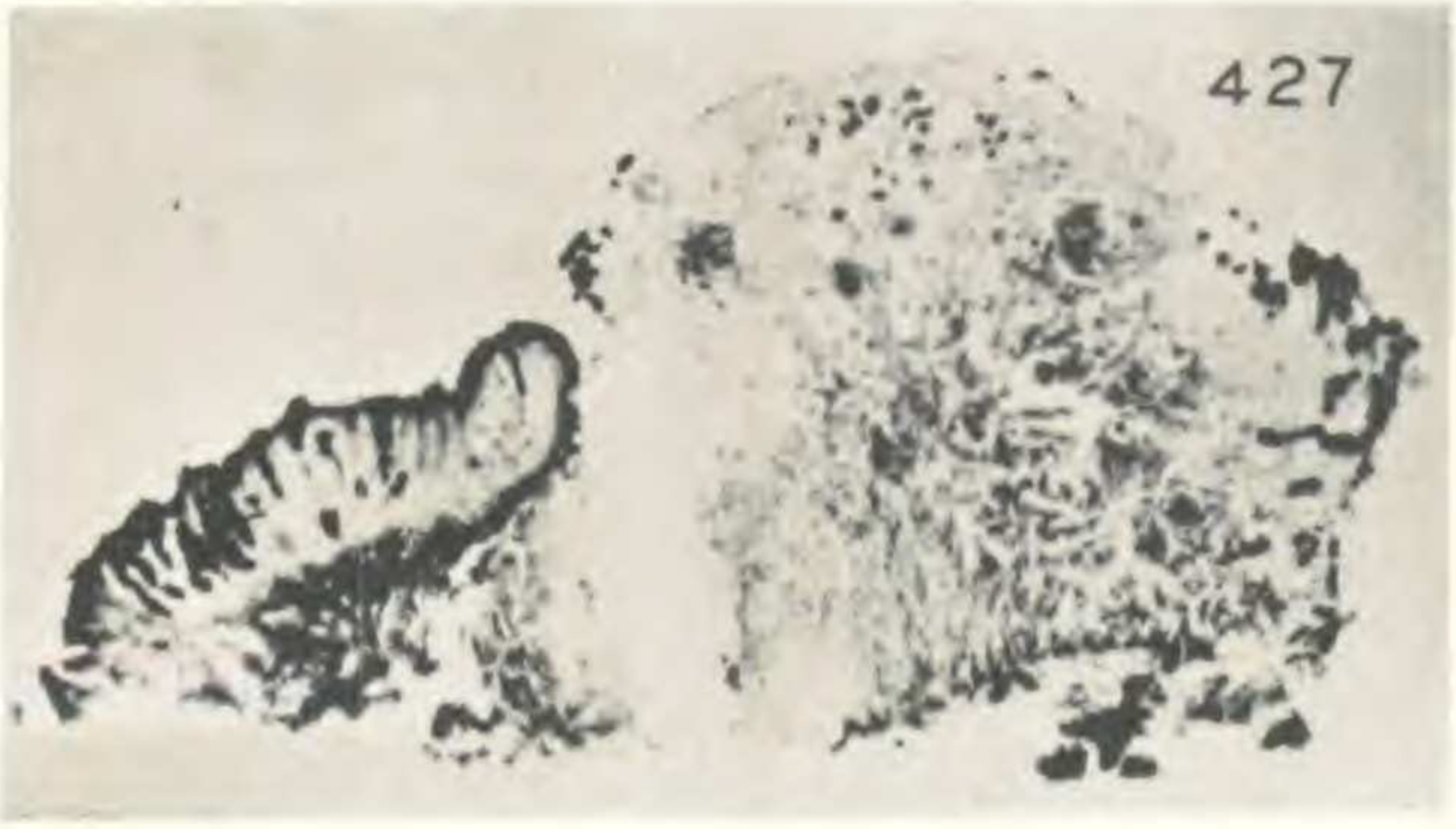
PLATE 65

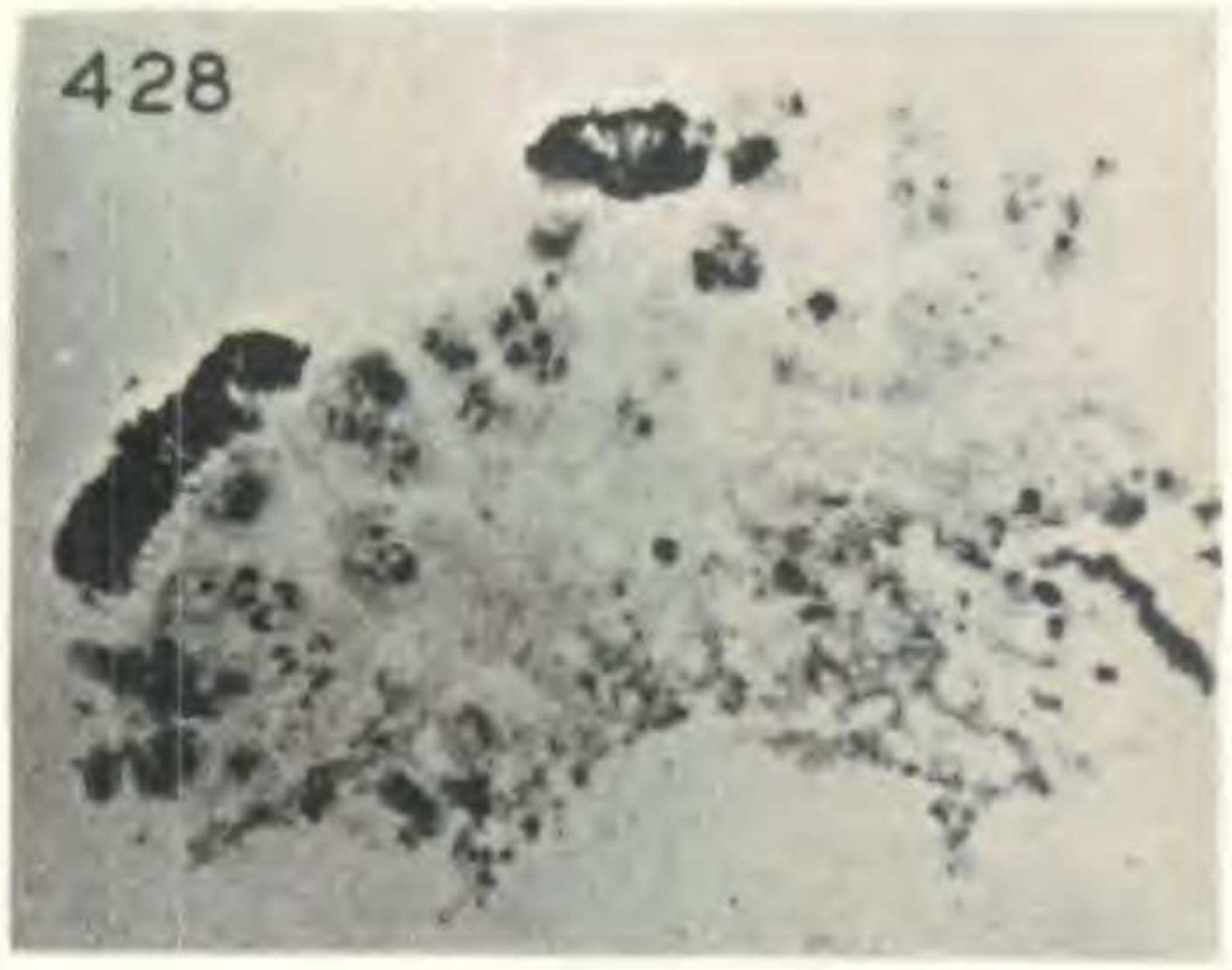
Fig. 424. *Buellia flavoplana.* Thallus on rock.
Fig. 425. *Kuttlingeria rufa.* Fruiting thallus on rock.
Fig. 426. *Rhizocarpon flavum.* Section of apothecium.
Fig. 427. *Buellia frigida.* Section of fruiting thallus.
Fig. 428. *Catillaria arachnoidea.* Section of thallus with apothecia.
Fig. 429. *Gasparrinia Siplei.* Thallus with apothecia in section.
Fig. 430. *Polycauliona pulvinata.* Fruiting thallus.
Fig. 431. *Gasparrinia Siplei.* Fruiting thallus.

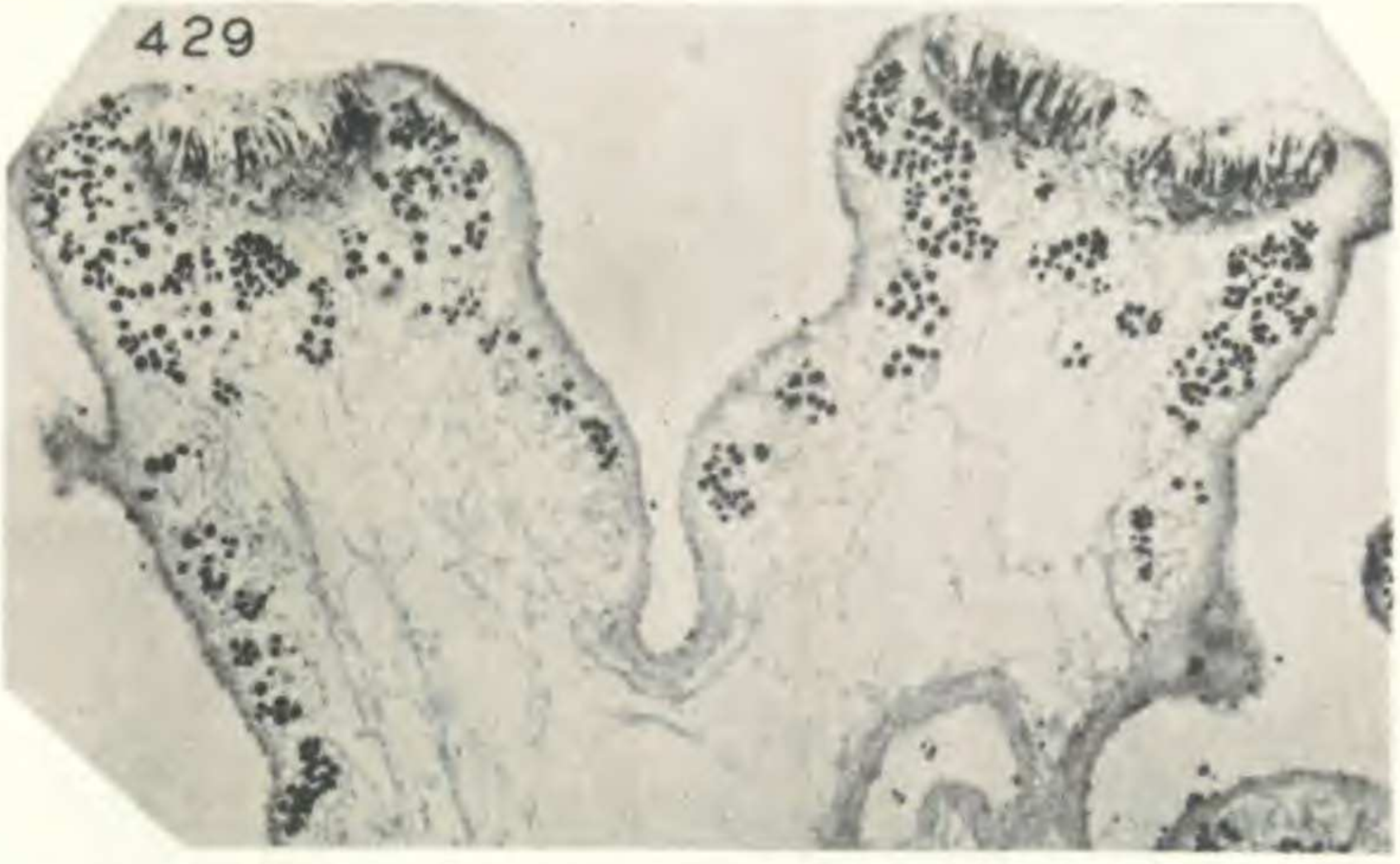

424

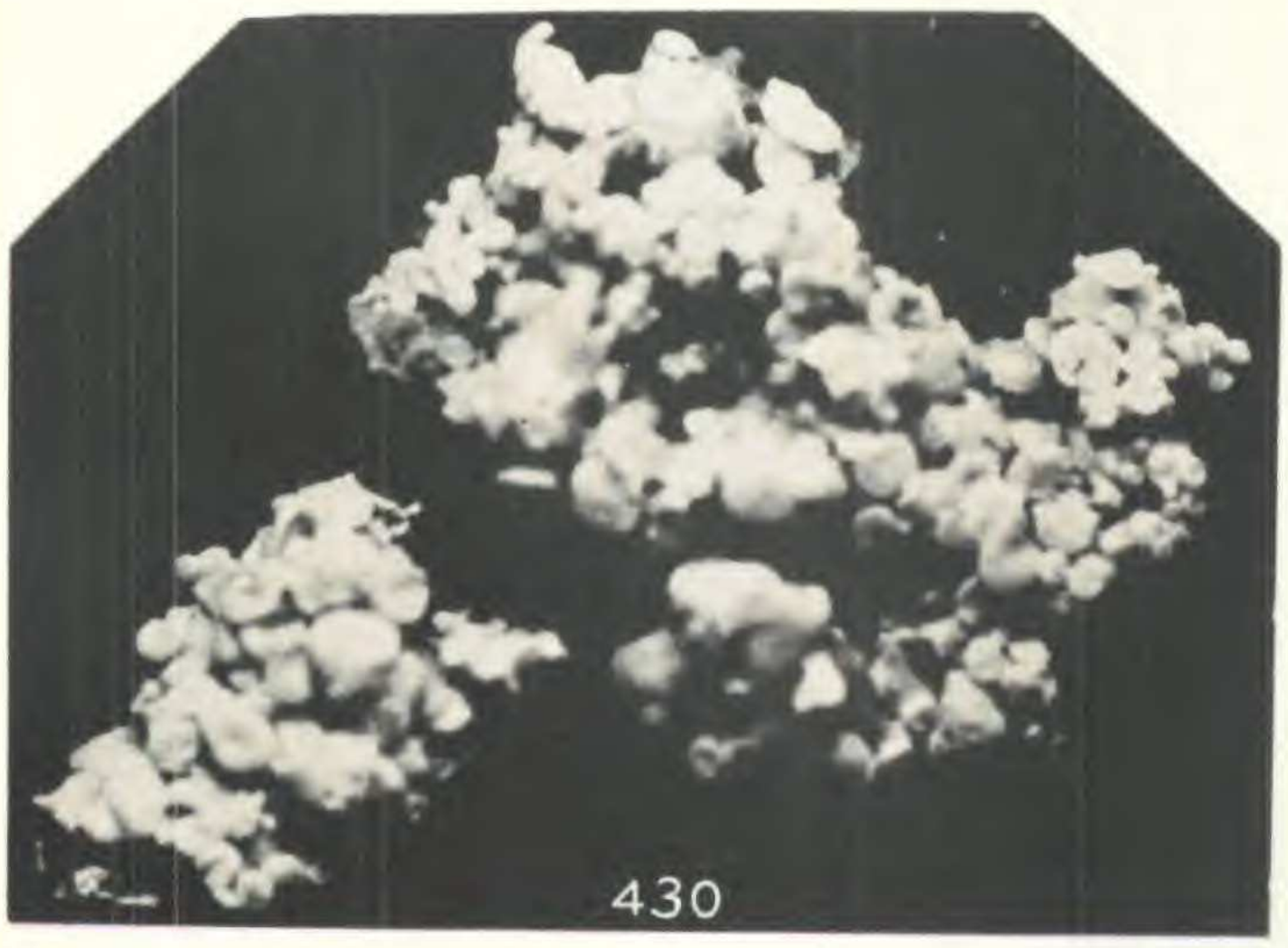

425

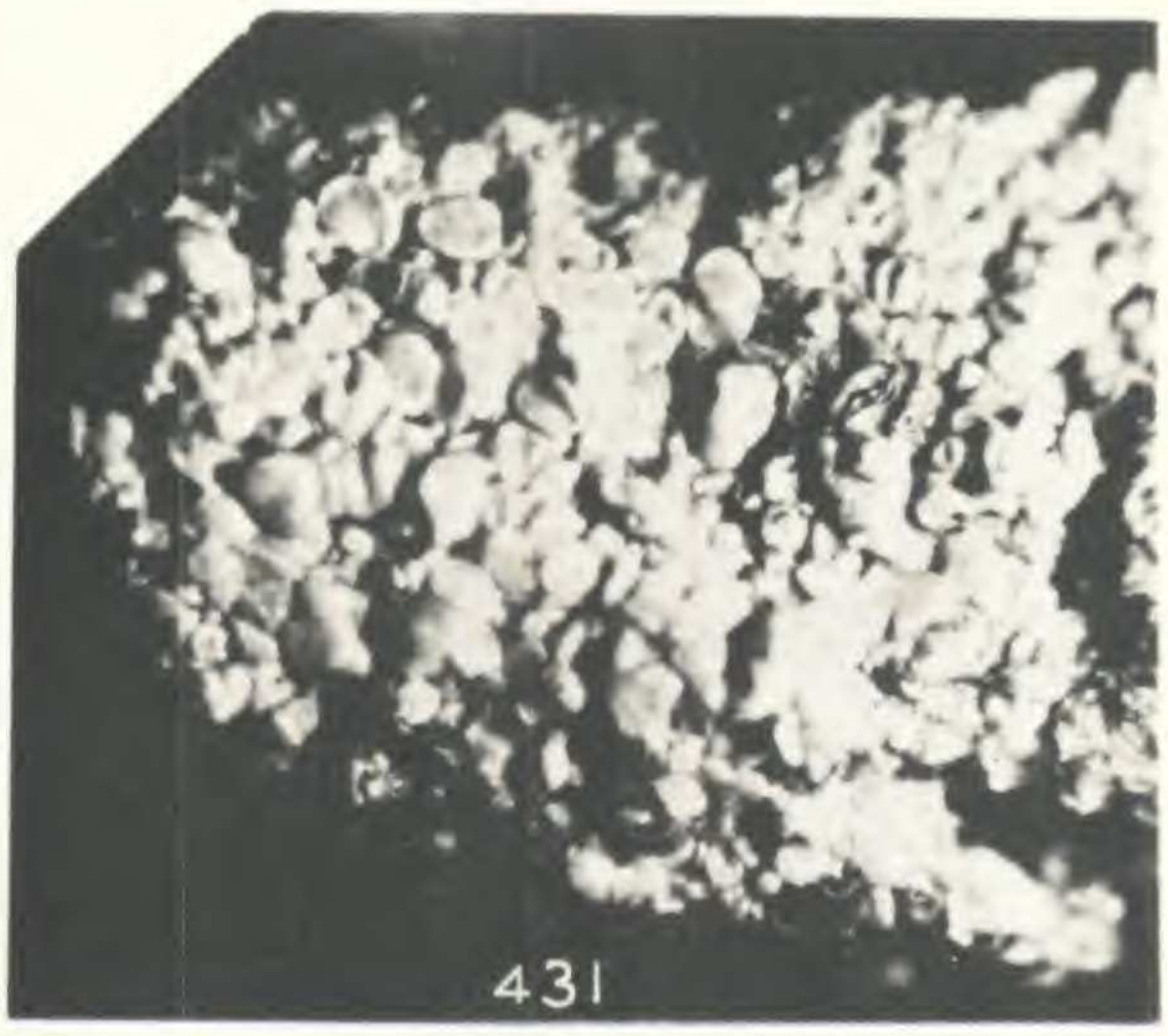

426


427


428


429


430


431

SECOND BYRD ANTARCTIC EXPEDITION

III. MOSSES

EDWIN B. BARTRAM

The mosses collected by Mr. Siple in Marie Byrd Land and King Edward VII Land in connection with the Second Byrd Antarctic Expedition represent five distinct species. *Grimmia Antarctici* is easily the dominant type, comprising the greater part of the collections both in number and quantity. *Barbula Byrdii* and *Sarconeurum glaciale* rank next in the order of abundance, and the two Bryums, *B. Siplei* and *B. antarcticum,* occur sparingly in small tufts.

It is not without significance that these mosses, in a broad way, are closely allied to some of the most cosmopolitan specific types such as *Grimmia apocarpa* and *Bryum argenteum.* A common origin within comparatively recent times is the inference that might be drawn from these facts.

Growing as they do on true nunataks surrounded by perpetual ice, hundreds of miles from the nearest known vegetation in any direction, the natural query is "where did these mosses come from?" Introduction through the agency of birds or by means of air currents is possible but hardly probable. A more likely theory is that these colonies are representative of a few extremely hardy, vigorous remnants of a former climax vegetation that have managed to maintain a hold on life in the face of increasingly rigorous conditions of almost unbelievable severity.

The types of the new species are in the writer's herbarium, and duplicate sets of the series will no doubt be distributed by Mr. Siple to the representative herbaria both here and abroad.

TORTULACEAE

SARCONEURUM GLACIALE (Hook. f. & Wils.) Card. & Bryhn, Nat. Antarct. [Discovery] Exp. Musci. 3. 1907.

Didymodon ? glaciale Hook. f. & Wils., Crypt. Bot. Antarct. Voy. Erebus & Terror. 102. *pl. 152. f. 6.* 1845.

Sarconeurum antarcticum Bryhn, Nyt Mag. Naturvidensk. **40**: 205. 1902.